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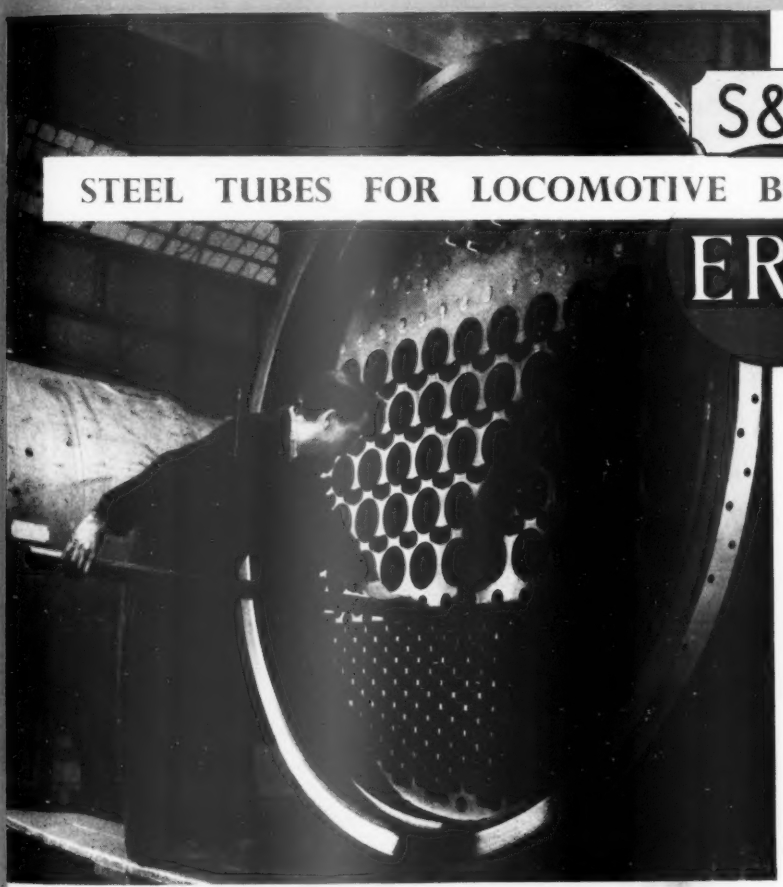

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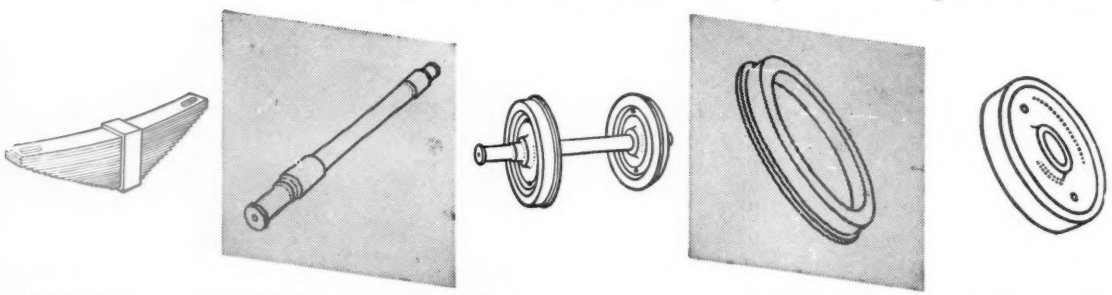

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First Things First

IT is clear from the speech made on Tuesday to his constituents by Mr. Peter Thorneycroft, the first public speech since he resigned as Chancellor of the Exchequer, that there are grounds for believing that the Government is unwilling to treat its own spending as it is treating industry, including transport. Giving his reasons for resigning he stated that he could not "accept for the Government in its own housekeeping a standard of financial stringency different from that which I am seeking to impose and was, in fact, imposed on others." There is indeed a contrast between the drastic measures taken last September, and the present attitude on the part of the Government as to the £50,000,000 by which the next Estimates are likely to exceed the combined total of this year's Estimates and the Supplementary Estimates. In September, the bankers were instructed to hold the level of bank advances for the next 12 months and at the same level as the last 12 months. Those concerned with public investment were told to hold investment over the next two years, in money terms, at the same level as last year. It was intimated to the British Transport Commission and British Railways that if wages were to rise, no more money would be made available, and thus fewer men would have to be employed, or services reduced. To speak of "a mere £50,000,000" as though it were a trifle, is nonsense. To control inflation, there should be cuts in the spending by Government departments. It is unsound to cut expenditure on industrial production, which alone can result in prosperity. A large share of national production is represented by the railway industries, which depend in large measure on the implementation of the railway modernisation plan; and the ability of industry as a whole to function and to produce efficiently, depends on the service it receives from the railways as carriers; that service, despite efforts to improvise improvements, can be radically improved only by modernisation of railway plant and equipment.

Mr. Charles F. Cleaver

TWO outstanding qualities of Mr. Charles F. Cleaver, whose photograph and biography are published in this week's Personal Section on his retirement from A.C.V. Sales and B.U.T., are the originality of his mind and his likeable personality. Both have been of immense help to him during his long and productive career for, while his fertile brain never ceases to turn out new ideas, their practical realisation has often been due to the willing help he has received from those in a position to implement them. Co-operation on the Great Western Railway resulted in its adoption of the first diesel-mechanical railcar in this country. In this, vertical engines were mounted accessibly on the outside of the frame, yet beneath the floor. The final drive was in the axle-box. The help of Mr. G. B. Howden resulted in the adoption of this design on the Great Northern Railway of Ireland, on which the six-car combination was first tried out and on which 110 of these vehicles are now running. Collaboration with Mr. James Courtney of the U.T.A. originated the first flat-engine railcars, now the basis of the large fleet currently being introduced on British Railways. An achievement of which Mr. Cleaver is justly proud was the production of the first six-wheel drive chassis in this country for road vehicles, and of three, four, six, and eight-wheel chassis, each except the three-wheeler being all-wheel-driven. No doubt use will continue to be made of Mr. Cleaver's remarkable ingenuity, perhaps in a consultative capacity.

B.T.C. Annual Census of Staff

THE value of the Annual Census of Staff of the British Transport Commission, a 10-page leaflet published by that body at 1s., is lessened by the time-lag in its production: the particulars of numbers employed, their average rate of pay, and their earnings are in respect of the week ended March 23, 1957. It would be interesting to know the extent to which staff had increased or decreased up to, say, November last. Surely earlier publication is not impracticable. As to rates of pay and earnings, in view of retrospective pay increases awarded after the census had begun, the Commission has issued a supplement. This shows that the average earnings of railwaymen in the week ended March 23 last year, excluding clerical and workshop staff and adjusted to take account of retrospective increases in wage rates granted shortly afterwards, are estimated at £11 9s. 1d., or 10s. 3d. higher than the previous year. The average earnings of men in April, 1957, for the industries for which the Ministry of Labour obtains statistics were £12 1s. 6d., and for manufacturing industries only £12 8s. 11d. These averages do not take account of the increases in rates in the engineering and other industries during the summer.

New Rolling Stock for L.T.E.

IMPROVED services and an easing of rush-hour travelling conditions are envisaged by London Transport when new rolling stock to the value of some £5,250,000 becomes available. As recorded in our Contracts and Tenders columns elsewhere in this issue, a contract to the

value of £250,000 has already been placed with the Metropolitan-Cammell Carriage & Wagon Co. Ltd. for 13 "R" stock cars for use on the District Line. With the rearrangement of certain existing trains and the conversion of some cars at Acton Works, it will be possible to transfer some cars from the District Line to lengthen the Circle Line trains from five to six cars. This will also enable "R" stock cars to be used for the Earls Court to Olympia shuttle service. For the Metropolitan Line services to Amersham, Chesham, and Watford, 248 cars are to be ordered at a cost of some £5,000,000. Each train will consist of four driving motor and four trailer cars. The new stock will have lightweight unpainted aluminium alloy bodies, rubber suspension for smooth running and economical maintenance, and fluorescent lighting. It will replace the present electric and steam hauled compartment type carriage in use on the line.

Overseas Railway Traffics

CANADIAN PACIFIC RAILWAY revenues for November, 1957, were $41,910,169 (against $42,999,220 for November, 1956) and railway expenses $36,915,776 ($38,694,435), so that net earnings were $4,994,395 ($4,304,785). Aggregate net earnings from January 1, were $34,460,626 ($37,332,269). Operating revenues of the Canadian National Railways for the same month amounted to $60,086,000. Expenses, taxes, and rents totalled $60,389,000, resulting in a net operating income deficiency for the month of $303,000. In November, 1956, operating revenues were $65,951,000; expenses, taxes, and rents were $62,157,000, and net operating income was $3,794,000. The aggregate net operating income to November 30, was $3,978,000 compared with $47,974,000 for the corresponding period of 1956. Railway operating revenues of the International Railways of Central America for November, 1957, amounted to $1,252,276, a decrease of $131,968 compared with November, 1956. The aggregate net revenue from railway operations for the period January 1, to November 30, was $1,914,667 ($2,472,805). Costa Rica Railway receipts for November were colones 1,647,986 compared with colones 1,579,508 for November, 1956, an increase of colones 68,478. Aggregate receipts from July 1, amounted to colones 8,636,083 (colones 7,866,884). At November 30, the official exchange rate was colones 15·87 to the £.

New Activities at Dundalk

DUNDALK locomotive, carriage, and wagon works, established in 1881 by the Great Northern Railway of Ireland, were taken over on January 11 by the new company, Dundalk Engineering Works Limited, which is engaged in various types of engineering work. Contact has been made with British and Continental firms which were interested in the possibilities of work on a contract basis; and the new owners have decided to enter the highly competitive world market for railway work besides catering for local needs in Ireland. The announcement that the present agreement between the Dublin and Belfast Governments for joint operation of the G.N.R. would not be renewed, coupled with the extensive closing down of secondary lines of the G.N.R., meant that the type of work hitherto undertaken in the works would diminish to a considerable extent, with consequent danger of unemployment. Dundalk was the cradle of many fine locomotives and passenger vehicles designed by G.N.R. engineers —though some of the better-known engines, such as the Glover three-cylinder compound 4-4-0s of 1932, were built by Beyer, Peacock & Co. Ltd. It is gratifying that the association of the works with railways should continue.

Electrification in the Eastern Region

CIVIL and electrical engineering work on the Colchester-Clacton-Walton lines, which are to serve as a proving ground for the new equipment and vehicles that will work to the 25-kV. 50-cycle a.c. system elsewhere in the Eastern Region, is making good progress. Details of the work are given elsewhere in this issue. The Liverpool Street, Chelmsford, and Southend Victoria lines are at present electrified at 1,500 V. d.c., but it is hoped to convert these lines to 25 kV. a.c. during 1959. It has been found that the 1,500-V. d.c. clearances are sufficient for a.c. at 6,600 V. and power will, therefore, be supplied at this voltage where it proves too expensive, or not practicable, to arrange for the greater clearances. This will not cause any difficulty in working; the transition from one voltage to another will be made without affecting the running of the train. The current will be transformed and rectified through equipment on the vehicle and the existing d.c. motors will continue in use. For the time being, the through service from London to Clacton and Walton will be steam hauled, because the 22 miles between Chelmsford and Colchester cannot be electrified immediately, because of the competitive demands of other schemes.

Combating Winter Weather

THE fact that the uncertain weather experienced in this country during the winter months makes it impracticable for British Railways to provide lavish organisation and equipment to cope with the very worst conditions is emphasised by "The Man on the Line" in the January issue of *British Railways Magazine*. It would probably be found, he rightly points out, that in five years out of six the equipment would be lying idle. Although our railways cannot budget for unusually bad conditions, much more can be done to increase passenger comfort in the pre-heating of trains, which is still often insufficient. No doubt when fog, snow, or ice, delays trains, it often stops road transport, but the very nature of railways, with their fixed track, leads the public to expect good service in adverse conditions. The replacement of steam locomotives by diesel units will obviate delays through frozen water columns, and the availability of anti-freeze point lubricants can do much to alleviate a source of trouble in very cold weather.

Southern Region Civil Engineering Achievement

THE first passenger train to use the Nunhead loop since the flyover at St. Johns, Lewisham, was brought down in the accident on December 4 last, crossed the temporary two-span bridge at 7.16 a.m. on Monday. As Mr. C. P. Hopkins, General Manager of the Region, has remarked, the decision to remove the bridge and replace it with a temporary structure was a bold one. It was made by the Chief Civil Engineer, Mr. F. E. Campion, while rescue work was still in progress. His staff started immediately preparing plans for a temporary bridge. Within 36 hr. of the accident the train wreckage was practically cleared, but a special trestle had to be built to hold up the wrecked bridge while it was cut up. The 300 tons of steelwork was cut up and removed in 50 hr. By December 11, trestling, rubble, and ballast had been cleared, and the four tracks underneath made safe for running. The soil had already been tested, and as the last of the rubble was being cleared, erection began. One hundred and fifty men at a time worked in shifts on the demolition: shifts of 100 men worked on erection. This involved laying 150 tons of concrete in three days and then putting up the steel trestling and joists of the bridge during two weekends.

Multi-Purpose Irish Diesel Railcars

THE 275-h.p. diesel railcars introduced by the Ulster Transport Authority and described on another page generally follow the basic underfloor-mounted power unit and transmission layout familiar in many of the diesel-mechanical railcars operating on British Railways; but they differ in detail and in intended function. Some of the power equipment makes its appearance in this country for the first time; this includes the recently-developed pressure-charged version of the Leyland type 900 (B.U.T. type "L") engine which develops 275 h.p., and the Schneider single-stage torque converter built under licence by Self-Changing Gears Limited. The transmission also

features a four-speed automatically-controlled gearbox, first seen in a diesel set which operated in the London Midland Region in North Wales. The Authority states that it intends to use the railcars, which are designed to be worked as twin-car units, for high-speed passenger services during the day, in some cases running two twin-sets with a dining car coupled between; by night they may be used for hauling freight vehicles. This is one reason for the incorporation of engines of this relatively high power. The ways in which the railcars will eventually be operated, and the effect of this form of train on traffic returns, will be awaited with interest.

Transport in Parliament

WHEN Members of the House of Commons return to Westminster next Tuesday a changed front bench will confront them. The resignation of the Chancellor of the Exchequer, Mr. Peter Thorneycroft, and his two Parliamentary aides over the question of the determination with which inflation should be tackled, and the extent to which Government expenditure should be limited, is certain to heighten Parliamentary tension. Those concerned with transport matters, however, have reason to be grateful that Mr. Harold Watkinson, Minister of Transport & Civil Aviation, was promoted to the Cabinet last year, for without him the heavy capital investment programmes of the railways and the roads might well have become further casualties in the battle for cuts in the estimates. The fact that he remains, shows whose side he was on; and as he had already conceded some limitation of the British Transport Commission capital expenditure over the next two years, he was no doubt in a strong position to resist any further demands.

There is no reason to expect the new Chancellor, Mr Heathcoat-Amory, to make new demands on the Minister of Transport, for Mr. Heathcoat-Amory brings to the Treasure a long association with rural England and small business, and must be aware of the importance to their prosperity of an efficient and economic transport system. The only hope of establishing and maintaining this lies in the fulfilment of the present modernisation programmes as speedily as possible. Certainly therein rests the sole possibility of the British Transport Commission fulfilling the estimate that it cannot break even by 1961-62.

It is with the position of the Commission that Parliament will be mainly occupied during the coming months as far as transport matters arise. Members are greatly concerned with its present financial difficulties. Faced with fresh wage demands—which fortunately at the moment are not being pressed too hard or too speedily—and with disappointing traffics, last year's estimated deficit of some £60 million could be repeated this year or even exceeded. Higher charges have long ceased to be the answer to mounting losses; hence the need for pressing on with modernisation. The Commission accounts are not due till the Spring. Unless there is some evidence of improving traffics by then its position is certain to be debated fiercely and the Commission to come under heavy fire. Pressure for an inquiry, to which we referred last week, may then mount. It is difficult, however, to expect that Parliament can do anything about the position of the nationalised transport undertaking. The Government has already made its position clear. It has legislated to meet the deficits over a period up to the limit of £250 million and has stated since that this limit stands, and that it will grant no additional sums to meet any higher costs arising from wage concessions or otherwise. The Commission must therefore find its own solution to its own problems, if it can: a hard task indeed.

No other major transport matters are likely to come before Parliament during the next few months. With Government expenditure greater than last year, and faced with the necessity to continue the fight against inflation, the Chancellor is unlikely to be able to make any tax concessions of importance. That means that the road vehicle fuel taxes cannot be reduced or any other concessions made to help the transport industry. In all the circumstances, M.Ps. are more likely to be concerned with the possibility of an early general election and its probable effect on transport policy. This much is certain. If Labour were returned it would be faced with the problem of how to implement its pledge to re-nationalise road haulage. No decision on how this is to be done has apparently yet been taken. With transport faced with its present difficulties it would be most unfortunate if it were brought back into the arena of party political controversy.

Achieving Reliability in Freight Service

THE giving of a reliable and not necessarily speedy, freight service to British Railways' customers, and the giving of it immediately, without waiting for new equipment to be supplied under the modernisation plan, are stressed by Mr. C. P. Hopkins in his stimulating paper to the Institute of Transport last Monday. He can speak with the authority of one whose earlier years were spent on the North Eastern Railway—primarily a heavy freight line—and the L.N.E.R., as a former Chief Regional Officer of the North Eastern Region of British Railways, and now General Manager of the Southern Region; this last, though regarded as primarily a passenger carrier, originates something like £10,000,000 worth of freight traffic a year. His audience included many men prominent in the world of railway and other transport, several of whom joined in the subsequent animated discussion.

The paper is opportune. Despite disappointing freight traffics, there is an unwholesome tendency among many railway officers to pin their faith in the ability to quote competitive rates under the charges scheme and in material improvements such as the fitting of automatic brakes to all wagons and construction of new marshalling yards. To many customers, however, the cost of reliability of service is as important as the actual conveyance cost.

Among the measures provided for under the modernisation plan, new forms of traction, he stresses, must be introduced on a geographical basis, and passenger traffic in the main can be separated into distinct geographical blocks, whereas freight has its routes and activities much more spread, originating and terminating widely. As to the fitting of automatic brakes, because of the size of the conversion, the extra demand on the capacity of the wagon fleet during conversion, there is more need than ever to continue to treat British Railways wagon stock as common user, with a few very minor exceptions. Nor will the marshalling yard development and mechanisation result in their full measure of improvement to freight services until the whole pattern is complete throughout British Railways. All these measures must take time, and time is short if the railways are to retain—or even to make—a reputation for reliability of service.

Steps can be taken, Mr. Hopkins points out, to improve the service without the help of new equipment. He is right in insisting on reliability, rather than speed. The higher speeds of freight trains envisaged in the modernisation plan will help in the acceleration of passenger trains and make for better user of equipment; but most consignors and consignees desire reliability in transit. This results from a sound, that is workable, timetable for all freight trains; the latter must provide for perfect connections in marshalling yards and elsewhere, and these connections must be considered inviolable. How far reliability in transits has been achieved so far with individual wagons is debatable. Only periodical special checks from wagon labels and special records can tell. The record of the special export services to ports is good—but the figures of the amount of freight entrusted by traders to the railways are not. Reluctance to consign by rail caused by doubts as to railway reliability may cause only a marginal loss of traffic—but it is that marginal traffic that British Railways need.

Even when allowance is made for such factors as the still limited track facilities of our railways, the relative fewness of fitted wagons, the absence of automatic couplers, and the limited amount of shunting manpower

in yards, a workable timetable can be drawn up after a proper analysis has been made of the relevant factors. It will absorb timetable staff to deal with diversions and other factors. The efficient freight timetable also will call for more supervision in its operation. It will result in operating economies, which Mr. Hopkins enumerates.

His main contention—and one that cannot be over-emphasised—is that much can be done now to improve services. With freight terminals, careful supervision will help, until a better layout is made possible under modernisation. With road/rail transfer traffic, without prejudice to the development of new, intricate and expensive units, everything should be done to increase the supply of containers to present designs, using the normal type of wagon but very freely introducing as interim steps such simple mechanisms as mobile and other cranes, fork lift and other lifting apparatus: introducing them freely even in places known to be the subject of major modernisation plans.

The problem is largely one of morale. The Southern Railway resorted to improvisation when, under its General Manager, Sir Herbert Walker, it electrified many miles of suburban line in a very few years in the 1920s and 1930s. It succeeded largely because of the spirit with which all concerned were imbued. British Railways, also using improvised methods, can do the same today.

Holiday & Travel Exhibition

ON Tuesday, January 14, the "*Daily Herald* International Holiday & Travel Exhibition" opened at Belle Vue, Manchester. This exhibition, which will continue until February 8, is the first of its kind in this country. Its aims are to promote international goodwill and to present northerners with new ideas for holidays both at home and abroad. These objectives were the subject of speeches made at the preview luncheon at the Bavaria Restaurant at Belle Vue on Monday, January 13. At this luncheon, guests to which included the Lord Mayor of Manchester and the Mayors of several neighbouring towns, the Chairman was Mr. W. Surrey Dane, C.B.E., M.C., Chairman of Daily Herald (1929) Limited and a director of Tothill Press Limited, the company owning and publishing this journal. Mr. Surrey Dane reminded his listeners that holidays remain one of the non-political indulgencies of mankind. Holidays which bring individuals together so that they cease to be strangers and become friends go far toward forming a world brotherhood which will help the common man to accomplish a great deal that the politicians so far have failed to do. Nor is the economic side to be lightly disregarded. Holidays and travel are becoming one of our greatest industries and Mr. Surrey Dane stressed that this was one in the development of which the *Daily Herald* is always willing to help.

Lord Rusholme, a Member of the British Transport Commission and Chairman of the London Midland Area Board, also stressed the value of the exhibition for the furtherance of international goodwill. He quoted the dream of the late Mr. Ernest Bevin, in his lifetime a Director of the *Daily Herald*, that one should be able to buy a ticket for overseas travel at Victoria Station and make one's way abroad without a passport. While pointing out the interest and enjoyment of the overseas holiday, however, Lord Rusholme asked his audience not to forget the holiday in Britain. He reminded them that it is not necessary to leave these islands to find beauty spots or any of the other ingredients of a good holiday. One of the features of the exhibition was the British Waterways stand, on which details could be had of the attractive and novel holidays available on the canals of this country. It was particularly appropriate that Manchester should be the centre of a travel exhibition from the viewpoint of British Railways, for the first passenger railway in the world ran from Liverpool to Manchester. Today, involved in the modernisation plan, Manchester was once again in the forefront, for at Manchester commenced the electrification scheme.

Mr. Douglas Machray, Editor of the *Daily Herald*, Alderman Leslie M. Lever, J.P., M.P., Ll.B., Lord Mayor of Manchester, and Mr. J. G. Bridges, O.B.E., the Director-General of the British Travel & Holidays Association, also spoke. Mr. Machray claimed that the *Daily Herald* is no longer a Socialist propaganda sheet, and observed that no newspaper can hope to survive today if it is merely the mouthpiece for any particular political party. Mr. Bridges praised the British Transport Commission for giving these islands the finest system of transport in the world, and made a plea for staggered holidays. He pointed out that out-of-season vacations are rewarding in their lower cost and less crowded conditions of travel and accommodation.

The Exhibition is one that for scope and magnitude in its subject has not been equalled. Further details and photographs will be published in our next week's issue, but reference must here be made to the excellent and varied stands presented by British Railways. These include a mock-up of the largest type of British Railways steam locomotive on the "footplate" of which an illusion is given of lineside scenery streaming past the cab windows; a full-scale model of the cab of the latest type of diesel railcar; replicas of *The Rocket* of 1829 and of the first and second class carriages used on the Liverpool & Manchester Railway in 1834. There are signals of different types, photographic and film strip displays, a model British Railways pleasure craft, a working model of an automatic telephone exchange and the famous British Railways 600-ft. long model railway with several working trains. A large map shows the electrification plans of British Railways, and full information about waterways and railway holiday and travel facilities are available from an enquiry counter. These imaginative exhibits were devised by Mr. B. J. Elwood, Assistant (Outdoor) to the Public Relations & Publicity Officer, London Midland Region, British Railways, who is in charge of Exhibition work at Euston.

Standardisation of Rolling Stock

THE writer of a letter published in our correspondence columns this week argues in favour of much further standardisation of motive power by the British Transport Commission as a means of achieving maximum economies. This, he states, must be done by restricting the number of types of new locomotives, coaches, and wagons to the very minimum, and also by using the most economical designs available. While his argument may be sound in theory, it is in practice impossible to make simple decisions on matters which have so many implications.

Each Region of British Railways has a certain degree of autonomy in the design of the motive power, passenger, and freight stock which it operates; this is reasonable in so far as there are factors peculiar to certain lines or groups of lines in any one Region. The existence in each Region of mechanical engineers who have studied questions with a view to the solution of the problems faced in that Region means that alternative answers can be found to technical problems, which, if the design of vehicles was restricted to one body or group, might never be realised. Apart from this, the Commission has rightly decentralised on the workshops in certain Regions certain specialised development work; an example is the work on diesel-hydraulic locomotives now proceeding at Swindon, in the Western Region. This development is worth pursuing for its own sake. The work is too practical to be done at British Railways Central Staff headquarters at Marylebone, and obviously too experimental for a decision to standardise or not this form of transmission.

The validity of our correspondent's argument, that one standard design of each unit must inevitably lead to the greatest efficiency might also be questioned. As each Region is comparatively large and self-contained and is in many cases responsible for the repair of its own vehicles, in its own works, are there likely to be any appreciable savings as a result of a decision in this direction?

In fairness to the Commission, it must be pointed out that the large number of makes of prototype diesel locomotives ordered in the Autumn of 1955 under the modernisation plan was intentional. This was to give

British Railways the opportunity of operating experience with as wide a number of equipments and manufacturers' designs as possible, so that the best features of each might be finally selected. As these designs are now being, or are shortly to be, delivered to British Railways, it is inevitable that at this stage a diversity of types and designs must make their appearance. That the Commission should now feel able to order so many of one or more designs at one time—for example, 52 1,000-h.p. diesel-hydraulic and the 45 1,550-h.p. diesel-electric units from North British and Birmingham respectively—could, perhaps, be taken as a sign of growing confidence.

In his criticism of a "steam" outlook, in the decision to have five power classes of line-service locomotives instead of three, the correspondent, no doubt, has one eye on North America, where, more particularly in the U.S.A., most manufacturers offer only three basic types of main-line locomotives. This does not, however, prove that the American railways would not employ other sizes of power unit if their construction were considered economical by the private builders—who construct all locomotives in North America. Moreover conditions in Britain call for some less powerful types of motive power.

The economics of building a wider range of units to cover motive power requirements, compared with a limited series of smallish units which are then operated in multiple to obtain the required haulage capacity, are not as simple a matter to determine. On a first cost basis alone, typical current prices for, for example, 2,000-h.p. and 1,000-h.p. diesel-electric units for operation on the same railway, would show a price-per-h.p. ratio comparison of around 2·5 to 3 respectively. Thus, on this basis, it could be extravagant to concentrate solely on smaller designs. Also, problems of greater maintenance costs and increased overall locomotive lengths are likely to be encountered when two, or more, smaller units are operated in place of one large locomotive.

Again, the variation of passenger coach lengths, to which our correspondent refers, is not such a critical item as might first appear, as the number of items dependent solely upon the length of the vehicle which have to be kept in stock at repair centres, is very small compared with, for example, bogie components, window frames, and panels, which are, in fact, standardised on British Railways.

Notwithstanding the foregoing, our correspondent does raise some apparent inconsistencies of the Commission or the individual Regions, which do not seem at first glance to be easy to explain satisfactorily.

Design of the Mokameh Ganges Bridge

AS long ago as 1907 the question of building a bridge across the Ganges in Bihar—to connect the East Indian 5-ft. 6-in. gauge system on the south bank with the Bengal & North Western metre gauge system on the north—was under consideration. In 1909 the E.I.R. engineers actually prepared a scheme for a broad-gauge bridge consisting of 18 spans each of 250 ft. with foundations 100 ft. below L.W.L. This was objected to, however, by the B.N.W. administration, which argued that the bridge should be of metre gauge and of a different design. For 15 years this controversy appears to have continued intermittently, and eventually the Railway Board decided that the idea should be abandoned as financially unjustifiable. These and the other facts below are mentioned in an article by Mr. H. K. L. Sethi, General Manager and Chief Engineer of the Ganga (Ganges) Bridge Project, published in the *Journal of the Institute of Engineers.*

As a result of the 1939-45 war, the trend and volume of the trans-Ganges traffic changed considerably, and in the latter year investigations were reopened for a combined rail and road bridge near either Patna or Mokameh. On the face of it the Mokameh site had much more to recommend it, but the Bihar Government favoured a bridge near its capital city, Patna. The partition of the sub-continent in 1947, necessitating the subsequent construction of the Assam Rail Link to avoid Pakistani territory, made it urgent for adequate traffic facilities to be provided to connect Calcutta and South Bihar, south of the Ganges, with North Bengal and Assam, north-east of that river.

A preliminary general enquiry by Sir M. Visveswaraya in 1952 caused him to consider that the neighbourhood of Mokameh provided the more suitable site, taking into consideration traffic-flow, operational requirements, initial and recurring costs, engineering factors and other relevant matters. This view was later confirmed by results of experiments by the Government Hydraulic Research Station near Poona, which had been asked to examine the relative merits of the two sites and to determine the optimum length and correct design of the river training works considered necessary. The 1952 ruling was also finally supported on financial as well as engineering grounds by Mr. J. M. Fenton, who in 1956 was appointed Deputy Chief Engineer in charge of engineering surveys of the possible sites.

Observations from the early years of the century showed that near Mokameh there was a long and generally straight reach of the river, which had been flowing consistently in two channels during the whole period, one near each high bank. They also showed that the main channel had swung from the south side to the north and back again in a period of about 36 years for the complete circle of oscillation. In 1948 there was an unusually high flood, after which the main channel remained under the south bank though there was also a "fairly active" one under the north. Everything therefore pointed to the bridging of the south (main) channel and the blocking of the north.

The maximum discharge during the 1948 flood season was 2,448,900 cusecs, when the maximum velocity was 14·66 ft. per sec. and the water level was 141·1 ft. above datum; the width of the waterway at H.F.L. measured 11,700 ft. Actually, the highest flood level ever recorded at this point in 1918 was 141·5 ft., on the basis of which the all-time maximum discharge was assumed to be 2,517,509 cusecs. The catchment area above the bridge site is 293,000 sq. miles. According to the "Peak Flood Envelope Curve for the Rivers of the World," the maximum discharge should be 2,600,000, but for designing the bridge the figure of 2,750,000 cusecs was assumed to be ample.

On this assumption and using Lacey's formulae, the wetted perimeter works out at 4,423 ft., and allowing for pier widths, protection aprons in the end spans, and a clay ledge on the south bank, a total waterway of 5,648 ft. was provided, or 14 spans each 403·4 ft. in length. This waterway compares with 5,385 ft. provided at the Hardinge Bridge lower down the river, which was designed for a discharge of 2,500,000 cusecs. Altogether, the bridge has 14 spans of 403 ft. 4½ in. plus four land spans each of 104 ft. 9 in., two at each end, the lengths being between centres of bearings.

The maximum measured scour in the vicinity of the site was 53 ft. below L.W.L., and on the authority of the late Sir Robert Gales, builder of the Hardinge Bridge, and using Lacey's formula for scour in alluvial rivers, the maximum scour below H.F.L. works out at 126 ft., the figure adopted in designing the bridge foundations. According to that great authority, Spring, a grip of 50 ft. in the bed is sufficient for this maximum scour, but Gales preferred 65 ft., and this safer figure has been used at Mokameh. The depth of the pier foundations below the 141·5-ft. highest known flood level was therefore fixed at 126 + 65 or 191 ft. or −50 ft. below datum. In practice, however, the two pier-foundation wells nearest the abutments have been sunk to −60 ft. to allow for possible extreme scour conditions in their vicinities, the other main pier foundation depths being −50 ft. As it was decided that a clear headway of 35 ft. must be allowed for navigation above *mean* flood level, +139 ft., the depth from the underside of the main girders to the bottom of the foundations is approximately 189 + 35 or 224 ft. A description of the designs of the foundations and superstructure appears on another page.

LETTERS TO THE EDITOR

(The Editor is not responsible for opinions of correspondents)

Suburban Electric Stock

December 15

SIR,—Perhaps "Jumbo," who, in his letter published in your issue of November 29, criticised the Southern Region design of suburban electric stock, can say what stock, with guard-controlled sliding doors, can *seat* 958 passengers in 10 cars, *plus* nearly half that number again standing?

He should pay a visit to London Bridge (Eastern Section) in the rush-hours, when he will see why the Southern sticks to its "outmoded design."

Yours faithfully,

J. E. LAKE

Aloha, Wiston Avenue, Worthing

Standardisation of Rolling Stock

January 7

SIR,—With a chorus of laments in railway circles about the investment ceiling imposed by the Government, it is fair to ask whether the British Transport Commission is making efficient use of limited investment funds.

The recent order of 52 diesel-hydraulic locomotives for the Western Region before the first prototypes had been delivered has been justified by the Commission on the grounds that the hydraulic transmission system has proved itself so well in Western Germany that further trials in this country are unnecessary. This I well believe; but why then are diesel-hydraulic locomotives ordered only for the Western Region, while other Regions order heavier and more expensive diesel-electric locomotives? As the initial capital cost, the maintenance costs, and the power : weight ratio of diesel-hydraulic locomotives are all lower than those of diesel-electric, many more diesel-hydraulic than diesel-electric locomotives could have been built for the same investment. Why too cannot the B.T.C. make up its mind between the Voith and Maybach transmission systems instead of ordering locomotives of both types?

Efficient standardisation would have meant limiting the number either of diesel-hydraulic or of diesel-electric locomotive types to three—a main-line passenger, a heavy main-line mixed traffic, and a light all-lines mixed traffic—and meet different h.p. requirements by running several locomotives in tandem. The B.T.C. design department appears, however, to be dominated by "steam" thinking; we are to have five power classes and several different types within each.

There is a similar lack of uniformity in the new multiple-unit diesel sets. If diesel-mechanical sets are quite satisfactory for both express interurban and slow interurban and rural services in the Eastern, North Eastern, Midland, Western, and Scottish Regions, why does the Southern Region have to have diesel-electric sets for similar services? What purpose can there be in diesel-electric sets for the Hampshire lines that weigh 70 per cent more than equivalent diesel-mechanical sets while providing fewer seats?

Efficient standardisation would have meant using one basic type of carriage shell for most types of passenger traffic and varying only the internal layout. Instead passenger carriages are now being built according to four different methods:

(1) Tubular aluminium bodies without underframe. This method is the most economical but is used only for a few Wickham-built diesel sets for the Hull area.

(2) Integral aluminium bodies-cum-underframes. Other non-express diesel sets are built according to this method, but according to four different designs, by the Derby Works, Metropolitan-Cammell, Cravens, and Birmingham Carriage & Wagon Co. Why this unnecessary diversity?

(3) Integral steel bodies-cum-underframes for the express diesel sets for the Western and Scottish Regions.

(4) Steel carriages with bodies separate from underframes. This is used for all new locomotive-hauled stock and for the units of electric and diesel-electric train sets.

Not even body lengths are being standardised. There are 64-ft. and 57-ft. coaches without any apparent reason. Diesel-electric sets with coaches of both lengths have been produced for the London-Hastings (via Tunbridge Wells) service. Electric suburban sets for the Eastern and Southern Regions have 64-ft. bodies; otherwise identical sets for the Euston-Watford service have 57-ft. bodies.

Yours faithfully,

F. E. LAMOND

29, Oakwood Road, Bricket Wood, St. Albans

The U.S.A. Paradox in Transport

December 28

SIR,—On November 14 Mr. Daniel P. Loomis, President of the Association of American Railroads, talked to the New York Railroad Club about the paradoxical position of the U.S.A. railroads as public carriers. Though they can carry a ton of goods one mile for an average revenue of 1·5 cents against a cost of 6 cents a ton-mile by road transport, the railroads' share of inter-city traffic declined from nearly two thirds of the total 1939 volume to less than half the 1956 total. Between these years road transport increased its share from 10 per cent to 18 per cent and inland water carriers their share from 4 to 8 per cent.

Mr. Loomis stated that, against the inherent advantages of other types of transport, the railroads asked nothing more than to match their own advantage of volume transport at low cost. This they were not permitted to do because their competitors enjoyed a variety of advantages which were neither inherent nor in the public interest, but were wholly artificial, being conferred by Government through subsidy or unequal taxation. For instance, all taxes and license payments by intercity motor carriers, reporting to the Interstate Commerce Commission, amount to about 7·5 per cent of total operating revenues. In contrast, total tax payments by the railroads take 11 per cent of total operating revenues and an additional 20 per cent of these revenues goes to provide and maintain their lines. To get what the motor carriers have for 7·5 per cent out of each revenue dollar, the railroads spend 31 cents.

The railroads are also hampered by unequal regulation in their efforts to apply their own advantages in the competitive struggle. The Interstate Commerce Commission often requires the railroads to quote rates higher than would otherwise be necessary merely to protect other carriers from loss of traffic, while it has no power to prescribe rates for private and contract road hauliers, who account for over 60 per cent of all road traffic; neither can it consider the effect on railroads of rates proposed by inland water carriers. As a result of these unequal conditions, the railroads are losing such large volumes of traffic to competitors that they have difficulty in earning enough revenue to stay modern and efficient. Therein, concluded Mr. Loomis, "is found the explanation of this most unusual paradox of our times, our paradox in transportation." He added that time, hard work, and statesmanship would be needed to correct the unfavourable trends in railroad transport, which was "far too important to America's economic welfare and security to be permitted to be anything but physically and financially strong."

The A.A.R. President evidently takes a serious view of the present situation, but may be influenced by the lack of confidence which spread among American business circles in the last quarter of 1957. For nine months to September last the U.S.A. railway operating ratio was no higher than 78·14 per cent, against 77·26 per cent in 1948 and 76·85 in 1956. If trade revives about mid-summer, 1958, the railroads may recover the ground lost in 1957.

Yours faithfully,

R. BELL

Frognal, N.W.3

THE SCRAP HEAP

All Equal

Train corridors were jammed with an immovable mass of humanity. Threats of questions in Parliament merged with mild profanity—then a cattle train moved slowly past in the other direction. A painfully refined voice at the end of the corridor shattered the jumbled local comments with, "I say, chaps, if the animals can put up with it I guess we should."—*From "The Manchester Guardian."*

Tube Tunnel as Pedestrian Subway?

To relieve the pedestrian congestion on London Bridge at peak traffic hours, Mr. H. C. Hardcastle Sanders, a Member of the Common Council of the City Corporation, has suggested at a recent meeting that the disused tube tunnels of the City & South London Railway at this point might be adapted to pedestrian use. The possibility of equipping them with travelling platforms has been discussed. The tubes, only 10 ft. 2 in. in dia., formed part of the original section of the C.S.L.R., now incorporated into the Northern Line of London Transport. They were opened on December 18, 1890, with trains hauled by electric locomotives, but were closed when the extension to Moorgate was opened on February 25, 1900, using a new alignment to the north of the Borough.

The disused tubes lay derelict many years, but parts were adapted as air-raid shelters during the last war. The portion on the north of the river, including the former King William Street Station, became a private shelter for commercial offices, and is still used by them for storage. The under-river sections were isolated, and the tunnels south of the river became a public air-raid shelter.

The derelict under-river tubes do not seem well suited to pedestrian use, in view of their small dia. and sharp curves at the northern end. Moreover, the provision of suitable access would not be easy, and the southern end is not near the London Bridge station of British Railways; there was no tube station at this point on the original C.S.L.R. line.

Somewhere in China

The Chinese stamp reproduced in the accompanying illustration is believed to be one of a new series featuring railways and other transport. The colour is dark blue-grey. It is not known whether the yard shown is one now actually in existence, or symbolical of progress now being made in construction of yards.

Stamp on a letter received from Peking; it is one of a series depicting transport subjects

Hotel Built as Railway Station

The Grand Central Hotel, Belfast, was built, according to a correspondent, as a central city railway station, but was completed and furnished as a hotel. It was built, he believes, by the Belfast Central Railway Company to link up with the Ballyclare, Ligoniel & Belfast Junction Railway, incorporated in 1881.

This projected line was to connect up with the Belfast Central at Ardoyne, north-west of Belfast. After the work on the railway had begun the project did not receive adequate public support and was abandoned. The railway station, by then built and roofed, was sold by the Central Railway in its unfinished state and John Robb, a Belfast merchant, purchased it and converted it into a hotel. The nearest passenger station today to the Grand Central Hotel is the Great Victoria Street terminus of the Great Northern Railway.

Commemorating Extension of French 50-cycle Electrification

The medal struck to commemorate the extension from Strasbourg to Basle of the French National Railways electrification at 50 cycles, which affords electric working from Basle to Lille for freight and Valenciennes for passengers

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

RHODESIA

Umvukwes Branch

The 24½ mile Umvukwes branch line taking off from the Sinoia branch line at Maryland Junction 48½ miles from Salisbury, is to be relayed with 60 lb. rails and stone ballasted to a standard of 1,400 cu. yd. per mile at a cost of some £295,000. This branch serves the chrome ore producing areas of Mashonaland and increasing traffic has made it necessary to increase the standard of the track which was originally laid in 1930 with second hand rails on earth ballast.

New Wagon Repair Shop at Bulawayo

A new wagon repair shop 540 ft. long and 136 ft. wide costing some £138,000 has been completed in Bulawayo for Rhodesia Railways. One bay, 61 ft. wide and running the length of the building, will house the workshop machinery, while the other bay, 75 ft. 6 in. wide, will be for the main wagon repairs. The design of the structural steel allows another repair bay to be added when required. Four gantry cranes, running the length of the building, are to be installed: these will be on rails 23 ft. above ground level, two of them capable of carrying a five-ton load and two, on the repair side, 20-ton loads. Wagons undergoing repairs will stand on four railway tracks running through the building.

Rhodesia Railways wagons are given a general overhaul every four years, so that the large number of new wagons placed in service since 1953 are becoming due for their first major overhaul. Since March, 1953, Rhodesia Railways wagon stock has increased by nearly 50 per cent—from 7,945 to 11,738. A further 1,200 wagons are on order.

In the 12 months up to March, 1957, 2,023 wagons were given a general overhaul: 559 of them at Umtali. Another 1,798 came to workshops for light repairs and all but 284 of these were dealt with in Bulawayo. All machinery will be installed and the workshop in use by mid 1958.

Rail Trolleys Replaced by Coaches

Rhodesia Railways, part owner and lessee of the Victoria Falls Hotel, has announced that the rail trolley system operating between the hotel and picturesque parts of the Victoria Falls environs, has been replaced by a light coach service.

The trolley system, built in 1921 at a cost of £4,000, consisted of a double 2-ft. gauge track laid with 45-lb. rails from the hotel for about one mile to Trolley Junction and thence on single lines to the Victoria Falls Bridge in one direction and the Devil's Cataract and Boat House, nearly ¼ mile upstream from the actual falls in the other direction. There was no physical junction between the various lines.

Recently the Southern Rhodesia Government provided a road to the Boat House which has allowed the replacement of the trolleys by two nine-seat omnicoaches which run at regular intervals throughout the day from the Hotel to the destinations lately served by the trolley service.

TURKEY

Istanbul Suburban Electric Working

The State Railways suburban service between Sirkeci (Istanbul) and Halkali, 17 miles, electrified at 25 kV., 50 cycles, is reported to be giving good results. The accompanying illustration shows a multiple-unit train with coachwork and mechanical parts (except bogies) by De Dietrich & Cie., and bogies and other electric equipment by other French firms; the trains were described in our issue of September 30, 1955. The French-built Bo-Bo locomotives which haul long-distance trains over the electrified section were described in our issue of May 25, 1956.

Photo courtesy ["*La Vie du Rail*"

Multiple-unit electric train at Florya, Turkish State Railways; the set is one of 18 *built by De Dietrich & Cie. with* 50*-cycle electrical equipment by other French manufacturers*

UNITED STATES

Re-location of N.P.R.R. Main Line

In connection with the construction of the Noxon Rapids Dam in Montana, 17½ miles of the Northern Pacific Railroad main line is having to be relocated at a cost of $17,000,000. At present the railway runs along the south bank of Clark Fork River, but its relocation on that bank would include tunnelling and difficult rock cutting excavation. The line is therefore being diverted to the north bank below the dam and re-crosses the river near the head of the reservoir.

The re-location involves the building of a bridge consisting of a main span of 360 ft. flanked by spans of 120 ft. and 160 ft. The 360-ft. span will be a single-line steel truss structure, the erection of which would have been complicated, if normal falsework had been used, by the danger of high water. Consequently two pairs of temporary aluminium trusses were used, but being already in existence and only 280 ft. long, they had to be supported on temporary towers with inclined shoring.

Alternative Route Ticket Exchange

An unprecedented development in relations between the New York Central System and the Pennsylvania Railroad, which for more than half-a-century have been strenuous competitors, is that from January 1 the return halves of tickets between New York and nine cities in the Middle West served by both companies have become available over the routes of either. The two companies for some time past have been canvassing the possibilities of a complete merger.

B. & O. to Abandon New York Service

The Baltimore & Ohio Railroad has applied for powers to abandon all passenger service between Baltimore and Jersey City. Almost throughout B. & O. history its principal trains from Chicago and St. Louis to Washington and Baltimore have continued to Philadelphia and Jersey City, from which connection into New York City has been by ferry across the harbour, or, latterly, by railway-owned motorbuses through one of the road tunnels to Times Square. Such trains have included the "National Limited," "Capi-

tol Limited," "Diplomat," "Shenandoah," and also the Washington-Jersey City "Royal Blue."

Between Philadelphia and Jersey City running powers over the Reading and Jersey Central Lines require rental payments; also speed restrictions at various points result in the fastest B. & O. service taking 4 hr. for the 223·6 miles between Washington and Jersey City, with the cross-harbour time into and out of New York to be added, whereas the fastest time of the far more frequent Pennsylvania service is 3¼ hr. to and from the heart of New York. In these conditions passenger patronage of the B. & O. service has dropped by 46 per cent since 1946, and the loss so entailed is now running at about $5,000,000 annually.

MEXICO

New Station Planned

A new terminal station which will handle both passengers and freight is to be built at Ciudad Juarez by the National Railways. It is planned to bring the station into service by the end of September, 1958.

SWITZERLAND

Rigi Railway Bridge Reconstruction

The Schnurtobel Bridge on the Rigi Railway, a steel plate-girder structure spanning the gorge of that name on the lower part of the Vitznau-Rigi Railway, which has carried the trains since the opening of the line in 1871, is to be replaced by a new bridge in prestressed reinforced concrete. The old bridge, 249 ft. 6 in. long, consists of three spans carried on two trestles intermediately, and is set on a curve of 9 ch. radius and a gradient of 1 in 4.

The new bridge will be 262 ft. 6 in. long, and will be divided into two spans, of 147 ft. 9 in. and 114 ft. 9 in. respectively, carried on an intermediate concrete pier. The radius of the line over the bridge will be reduced to 7½ ch. Work began last summer, and is expected to be completed before the summer of 1958.

SAN MARINO

Plan for Restoration of Railway

The Government is reported to be negotiating with the Italian Government regarding the rehabilitation of the railway from Rimini (Italy) to the town of San Marino. A large part of this line was destroyed during the last war.

FRANCE

Market Station at Lyons

Work on the rail- and road-served market at Lyons-Perrache has been going ahead steadily. The two rail-served platforms will be 2,640 ft. long. An eight-track marshalling yard and one of the two road-served loading platforms have been completed. It is hoped that the station will be brought into operation in the near future.

Deviation Eliminates Level Crossings

By construction of a four-mile deviation of Route-Nationale 7 near Montargis, near Paris, in the South Eastern Region, and the construction of bridges to carry roads under or over the railway, five level crossings in the area are being completely eliminated and one reduced to secondary importance. The work is being carried out by the S.N.C.F. One bridge of three 54-ft. spans and two triangular half spans of 36 ft. 6 in. and 49 ft. respectively crosses three reception sidings, two main-line tracks, and the single-track Corbeil branch. A retaining wall leads to the second bridge of 48-ft. span over the single-line Orléans branch and a siding.

WESTERN GERMANY

Level Crossing Accidents

Statistics show that four or five of Federal Railway level crossings are damaged daily by road motor vehicles. The Federal Railway since 1950 has eliminated 1,400 level crossings. Another 50 have been replaced by overline or underline bridges, and a further 2,600 have been made safer by means of special technical devices or by the placing of hedges or rows of trees near to the crossings.

Welding Techniques

At the recent Essen Exhibition the Federal Railway arranged a technical display with the theme "welding and cutting." This, with samples of track, bogies and frames, also showcases and photographic material, showed the economies to be achieved in various fields with the use of modern welding processes.

During this display, the Federal Railway continued to carry out welding experiments. Much space was given to graphs and photographs of welding work carried out during locomotive, wagon and engine repair, and bridge construction.

Publications Received

Rights of Trains.—By Peter Josserand. Fifth edition, completely revised. New York: Simmons-Boardman Publishing Corporation, 30, Church Street. 7¼ in. × 5 in. 459 pp. Numerous diagrams. Price $6.00.—This fifth edition of a work which has long enjoyed great popularity among American railway operating staff, has been completely rewritten and arranged on new lines to take account of the numerous changes in signalling practice introduced during the last 20 years and the application of wireless and television to railways. The first edition appeared over 50 years ago and was written by H. W. Forman, a well-known figure in train despatching and, later, railway management, to facilitate understanding the "Standard Code" of train rules, adopted in 1889 by a convention of American lines as a basis for their individual rule books and to effect some uniformity in the working of the despatching system. Forman produced a second edition in 1925, but all later ones have been issued under the guidance of the present author, who has had many years experience as a rules examiner and despatcher. Every aspect of the subject is treated in detail and with great clearness and this greatly improved edition will doubtless command as cordial a welcome among American railway operating circles as did its predecessors. It forms a complete guide to the principles of train despatching as practised in the U.S.A. and is of much value to those in other countries having like operating problems to contend with, as also to signal engineers concerned with installations on lines worked under any form of despatching or centralised regulation of the traffic.

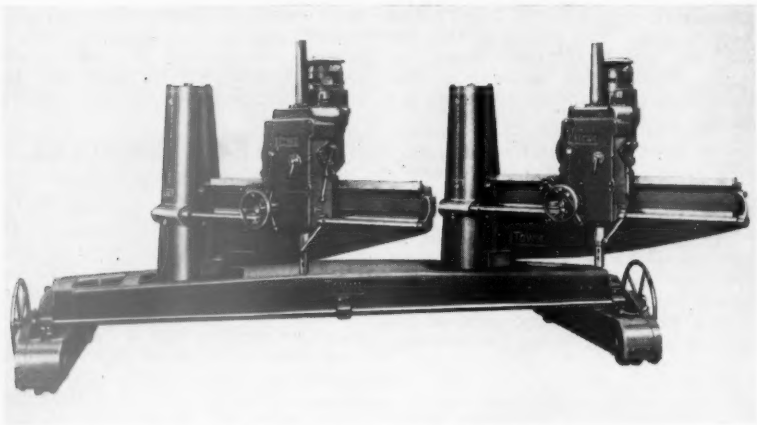
Soldering Aluminium.—This Bulletin is the fourth in the Aluminium Development Association series on the methods of joining aluminium and its alloys. After definitions and a brief account of the basic principles of soldering aluminium, and suitable fluxes, the book deals with the various soldering methods and equipment. There are also brief notes on the finishing of soldered components and on the process of soldering aluminium to other metals. Details of properties and characteristics of soldered joints dealt with under the headings of mechanical, electrical, corrosion resistance and solder embrittlement are also included. Copies of the Information Bulletin, No. 23, can be obtained from the Aluminium Development Association, 33, Grosvenor Street, London, W.1, price 2s.

Power Engineers.—This publication is a pocket handout, produced for the recent Middle East Conference held by the Brush Group in Beirut. It covers briefly the activities of the principal producing companies, besides the export organisation and recruiting and training schemes.

Party Outings by Rail.—This 40-page booklet issued by the North Eastern Region of British Railways is well illustrated with views of places that can be visited or seen en route and contains many suggestions for day and half-day outings suitable for parties. Many of the trips combine rail and road journeys and some involve sea passages. Those concerned with the organisation of outings should find this booklet of great value. Although primarily concerned with suggestions for short tours, it contains much other information. There are notes on many places of scenic, historic, and recreational interest. The booklet is obtainable free from British Railways offices.

Improved Facilities for Machine Tool Production

Increased output for railway industry at Fredk. Town, Halifax, Works



Twin column bogie type radial for plate drilling

EXTENSIONS of the Mile Cross works of Fredk. Town & Sons Ltd., Halifax, were completed recently. The company was founded in 1903 for the manufacture of radial drills and has specialised entirely in the production of radial- and fixed-column machines, except for a short period when shaping machines were also produced. When it was acquired in 1954 by Thos. W. Ward Limited, plans were immediately put in hand to expand and improve the production facilities to meet increasing overseas demands and to improve delivery dates for the home market. At present about 65 per cent of the total output is exported, chiefly to the Commonwealth, largely because of the forward ordering policy of overseas agents who are thus able to give immediate delivery from stock. Product design and development are the responsibility of Mr. Eric Town, Director & General Manager, who was appointed by the present owning company.

In modernising the plant priority was given to new equipment for boring and planing. The following machines have now been installed: two Swift-Summerskill all-electric planing machines, one having a capacity of 18 ft. × 5 ft. × 5 ft. and the other 8 ft. × 3 ft. × 3 ft. 6 in.; and one Union Gena V.E.B. horizontal borer. These machines are operated continuously by day and night shift working. Other new processing equipment includes a John Lund Precimax grinding machine and Pfauter spline hobbing machine.

Machine Shop Extension

To accommodate the additional plant and the revised layout for flow production, the machine shop has been extended by an increase of 60 per cent in floor space. This has also required the installation of a new heating system, supplied by Hayes Heating & Steam Services Limited.

A mechanically-fired Cochran boiler supplies hot water at 70 lb. per sq. in., this being pumped through a series of panel heaters throughout the factory and foundry. Staff amenities include shower baths.

The machines in current production cover all normal requirements for drilling up to 3 in. dia. at 7 ft. rad. on either low-base or box-bed machines. Electric drive is standard throughout the range and to reduce setting time a variety of tilting tables, universal tables, and angle-plate tables are available.

Twin-Column Bogie Drill

A recent addition to the range of machines for locomotive, wagon, and similar heavy plate work is the twin-column bogie type radial. Use of this machine effects a considerable reduction in plate handling as the complete machine, mounted on side rails, is readily positioned over a plate or stack of plates placed between the rails. The normal clearance between the underside of the bridge member across the bogies and the top of the rail is 12½ in. For general use this suits the laying of side rails at floor level but they can, of course, be raised to suit individual requirements.

Robust Construction

For plate work the complication of the elevating arm is not required; this permits the use of a robust single-piece casting for both arm and column. The pillar is mounted on ball bearings and the current collector gear at column top allows the arm to be swung through 360 deg. without any interference to the cabling.

Spindle drive is from a constant speed 5-h.p. a.c. or d.c. motor, driving through a gearbox which provides eight spindle speeds and three rates of feed in addition to a sensitive hand feed. Change of feed rate is made without stopping the machine. When required for tapping as well as drilling, a rapid reversing type motor is fitted, this being controlled by an electric drum switch on the saddle. Non-reversing types are controlled by a push button starter. Lubrication of the gearbox, which is fitted with nickel chrome gears, is provided by an inbuilt pump for the gears and syphon feed for the feed shafts. A sump level indicator is fitted. This model is available with a spindle radius of from 4 ft. to 8 ft. and from 1½ in. to 2 in. drill capacity in mild steel.

A section of the new extension: the radiant panel heaters are shown on the right, and in the foreground, assembly of twin column bogie machines

Diesel-Hydraulic Trains in Ulster

5-ft. 3-in. gauge sets of 1,100 *b.h.p. for interurban service have underfloor pressure-charged engines*

AS a measure intended to effect substantial operating economies on the Belfast-Londonderry line, the Ulster Transport Authority is now introducing eight diesel railcars, intended to operate back to back in pairs, but often with an additional buffet-dining car of ordinary stock between two twin-car sets. With a top speed of 80 m.p.h. and about 7 b.h.p. per ton of tare, or 5¼ b.h.p. per ton with a diner between two twins, it is proposed to provide considerably accelerated schedules for passenger traffic even to a timing of 105 min. for the 90 miles, inclusive of five stops; but there are also proposals that certain railcars of this type, with a variation in accommodation and parcels facilities, might be used at night to haul light freight trains.

Rebuilt Stock

These railcars have been rebuilt from ordinary 57-ft. bogie passenger stock at the Belfast works of the U.T.A.; and accommodation varies. Each single car has a right-hand-corner driving position at one end only; thus the minimum formation is a twin set if turning on a triangle or table is to be avoided. In each twin, one car has a luggage compartment behind the driving position; in the other the driving cabin is set against the connecting vestibule. Each car has through connection at both ends.

Second class accommodation is in open saloons, but the first class seats are in compartments with a corridor to the side. Passengers desiring meals can either go into the dining car or have refreshments brought to the small tables in front of all seats. The current formations for through Belfast-Londonderry workings seat 18 first class and 208 second class passengers on a tare of 188 tons, made up of 39½ tons for each railcar and 30 tons for the diner. At present each formation is being scheduled for 400 miles a day for five days a week. Fuel capacity in each car is 100 gal., enough for two return trips between Belfast and Londonderry.

In the rebuilds from the passenger coaches the vacuum brake equipment has been removed, and Westinghouse straight and automatic air brake systems provided, the former being for use in passenger working, solo or in multiple, and the second for use if any fitted vans or freight wagons should be hauled. There is a change-over cock and lever at one side of the underframe. Heating of the railcars is by circulation of engine cooling water, and of the diner by a Smith's Webasto heater. In the rebuilding no alterations have been made to the queen-post underframes except to add the subframe carrying the engine-transmission group; the carrying bogies are of the normal carriage type with SKF roller-bearing axleboxes. The outer bogie of each railcar is a carrying bogie; the inner bogie has both axles driven.

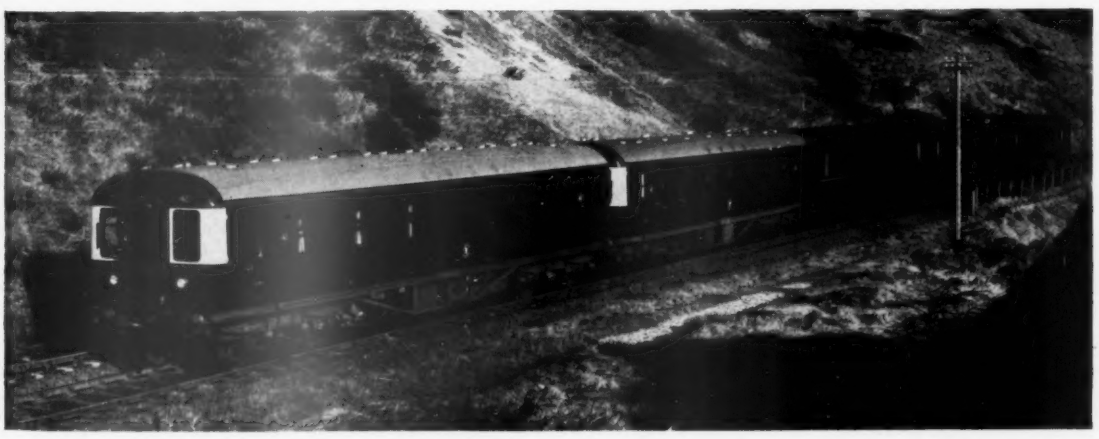
Engine and Drive

Power-transmisson equipment was supplied through British United Traction Limited, and in each car comprises one Leyland type 900 (B.U.T. type L) six-cylinder horizontal engine pressure-charged by a Schwitzer turbo-charger to give a top output of 275 b.h.p. at 1,800 r.p.m.; a Schneider-S.C.G. torque converter; a duo-directional set of epicyclic gears; a Wilson automatic change four-speed gearbox; and spiral-bevel axle drives. Hardy-Spicer cardan shafts connect the various transmission constituents, and that connecting the two axles is provided with Layrub couplings. Between the torque converter and the duo-directional box is a free-wheel, and then belt drives are taken off to the auxiliaries such as the compressor and dynamo, power to these auxiliaries thus being transmitted when the railcar is coasting with engine shut down.

Torque Converter

This is the first installation in the British Isles of the Schneider torque converter, licence agreements for which are held by Self-Changing Gears Limited, which will use it in conjunction with the Wilson epicyclic gearbox; but it is to be noted that this combination is a hydraulic transmission and not a hydro-mechanical one, for the fluid torque converter is always in circuit. The first step of the Wilson box is engaged from zero up to approximately 17 m.p.h., the second from 17 to 27 m.p.h., the third from 27 to 44 m.p.h., and the fourth step thence up to the top designed speed of 80 m.p.h. Rim starting tractive effort of one railcar is about 10,500 lb., the single-stage converter having the comparatively low torque multiplication ratio of 3:1. Against this starting tractive effort there is over 20 tons of adhesion weight available, and actually the combination is enough to start and get away with a gross load of 100 tons up 1 in 75 with only one engine working.

These U.T.A. railcars also form the first traction applications in the British Isles of the Serck-Behr cooling system with hydrostatic control of the fan drive; and also of the American Schwitzer turbo pressure-charger, the licence for which has now been taken by Holset Engineering Co. Ltd. The torque converter fluid is cooled in a separate heat-exchanger. Engine and directly-attached torque converter are resiliently carried as one group on the sub-frame through Metalastik shear-pad mountings.



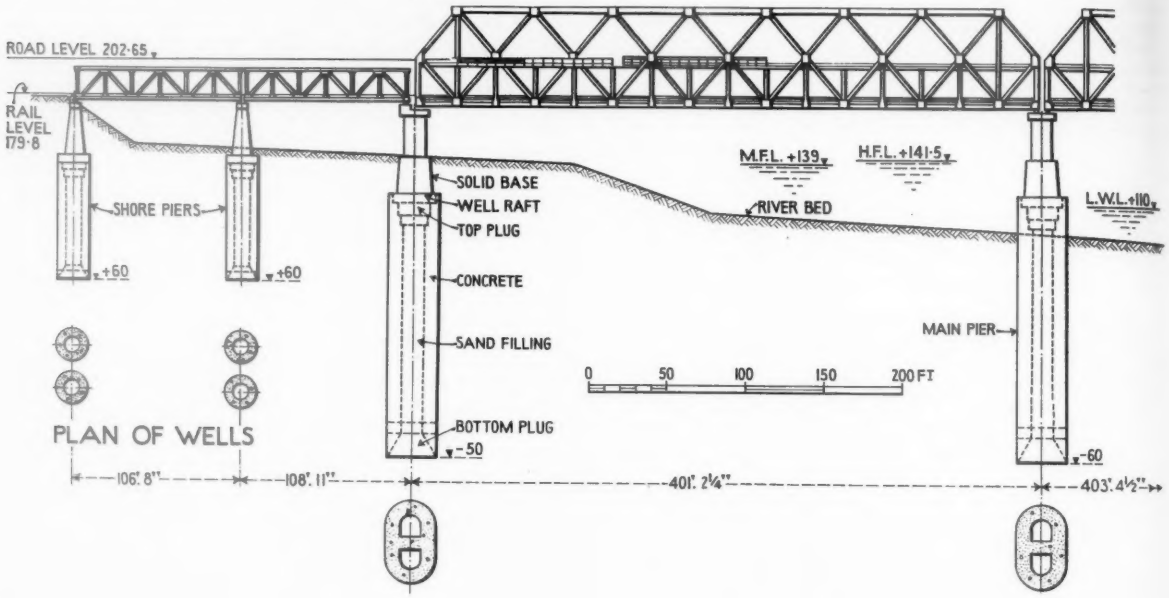
Five-car diesel-hydraulic interurban train, Ulster Transport Authority; buffet-dining car in centre, between two 550-b.h.p. twin-car units

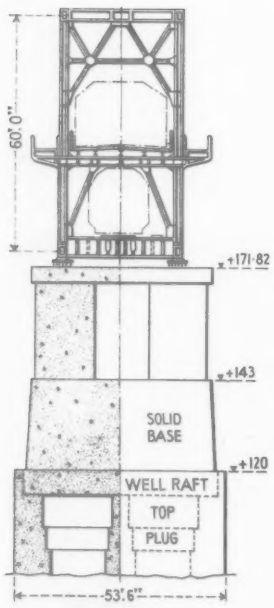
Foundations, Piers and Superstructure of the Ganges Bridge

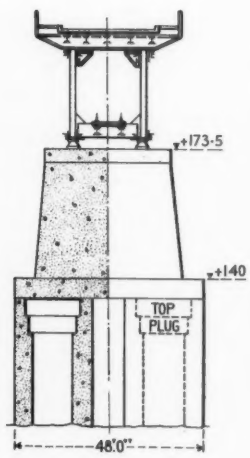
Design of the well-curbs, wells, piers, and spans and construction of the piers

THE current construction of the Ganges Bridge near Mokameh in Bihar has been the subject of periodic reports in these pages, dealing with the progress made on the earthwork, protection works, and pier-foundation well-sinking, but only now has information come to hand about the design of the wells, piers and superstructure. Reasons for the choice of the bridge site and the general design of the structure will be found in an editorial on another page.

River-bed borings revealed coarse, sandy soil with some clay nodules. At the three most southerly pier sites a clayey strata was pierced to reach deeper sand, and it is this firm clay in the south bank which, it was considered, made it possible to use the natural bank to confine the river without major protection. The design of the northern guide bank, constructed in 1956, was approved by the Hydraulic Research Station near Poona, and has already been described and illustrated in an earlier issue.







Elevation of shore and main spans and piers, with wells in plan and also in part-section

As the editorial explains, the foundation of each main pier is designed to be sunk to a depth of 191 ft. below maximum H.F.L., and to support a pier 224 ft. in height. It also has to withstand an aggregate load of 20,342 tons, made up of live load with impact for rail and road 1,476 tons, dead load 1,548 tons, weight of pier 2,020 tons, and the well-foundation 15,298 tons. The area of its base was designed to cover 1,493 sq. ft., giving an average foundation pressure of 13·6 tons per sq. ft., 0·6 tons more than in the Hardinge Bridge. With 85 per cent of the total load imposed prior to the erection of the superstructure there should be little fear of subsequent settlement.

Design of Foundations

To meet these requirements the well-foundations of the main piers are 53 ft. 6 in. long by 32 ft. wide with semi-circular ends and D-shaped dredge holes. The mild-steel curbs on which they were sunk are 14 ft. 10 in. in height and each weighs about 125 tons.

The piers complete as they appeared during the monsoon before girder erection

Steel curbs were preferred to concrete so that for sinking in water additional strakes could be added to serve as caissons. They are also convenient for pneumatic equipment by providing a ring seat inside. The wells are of mass concrete and have 9-ft.-thick steining to reduce as far as possible the use of kentledge. To cap each well is a 6-ft.-thick R.C. raft. The wells were sand-filled and plugged with concrete top and bottom, the latter to avert possible sand leakage should scour approach the curb cutting-edge too closely.

The piers consist of solid concrete bases up to 2 ft. above H.F.L., each carrying two 15-ft.-dia. circular columns with the aim of effecting economy in concrete and reducing pressure on the foundations. The columns are surmounted by a capping slab 4 ft. thick.

Design of Superstructure

The reasons for the size and number of the spans are discussed in the editorial, and their general design will be seen from one of our illustrations. Each main girder has eight panels or 16 sub-panels 24 ft. 9 in. long, and the girders are spaced at 29 ft. between centres. The railway track rests on a welded floor-system carried by the bottom booms. Above it, the roadway is supported on an upper deck resting on the top booms, and under this deck there is a clear headway of 17 ft. 9 in. above rail level. Other main dimensions and features are shown in the illustrations.

The whole structure has been designed to withstand as far as possible earthquake shocks. Partly for this reason, the smaller shore spans are added as cushions to restrict any damage that may be caused by forces transmitted from the high approach banks. They are, however, also useful for spanning sidings along the south bank and the northern guide-bank for running out pitching stone.

Reverting to the stability of the natural south bank of the river at and near the bridge site, it is noteworthy that only its upper part, which stands nearly vertical is protected with stone. This bank consists of red clay and has withstood erosion for a century or more. Nevertheless, a watch is being maintained, and annual borings of the clay ledge are proposed to ascertain whether any serious erosion is taking place during flood-time likely to alter its cross-section as compared with that prior to the blocking of the north channel. A powerful launch equipped with echo-sounding apparatus is available to guard against any deepening of the south or main channel.

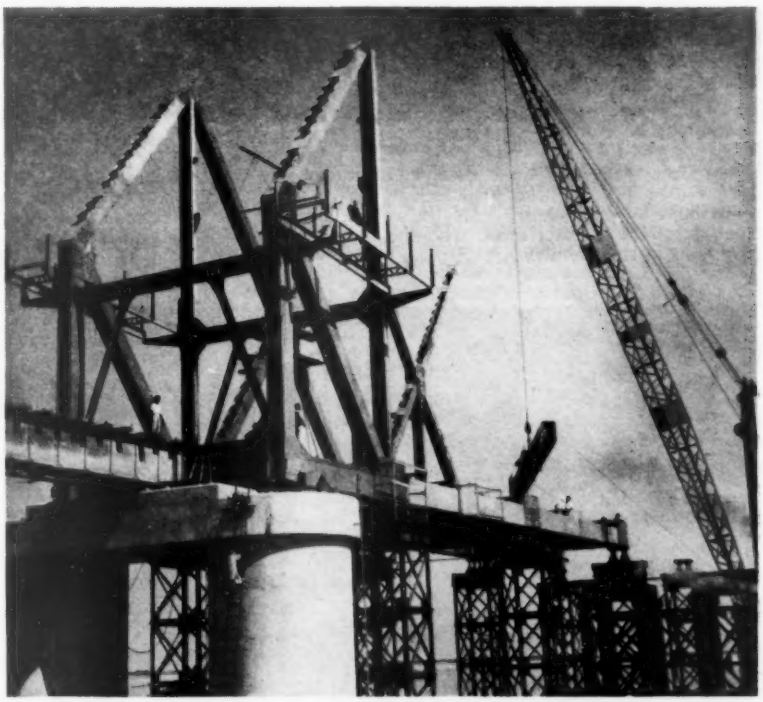
Well-foundation Construction

Specifications for concreting included stone broken on the south bank to 3 in. for steining and mass concrete work and 1½ in. for reinforced work. Controlled cement concrete had to have a minimum cylinder strength of 2,400 lb. per sq. in. for reinforced concrete and in well-steining used within 20 ft. above and 10 ft. below the line of maximum scour. Elsewhere in the wells the minimum strength laid down was 1,500 lb. per sq. in. after 28 days. The minimum cement contents for each 100 cu. ft. of finished plain concrete 1,500-lb. strength, and 2,400-lb. strength and of reinforced concrete were 13 cwt., 15 cwt., and 18 cwt. respectively. For the top and bottom plugs a mix of 1:3:6 was used.

For the piers in water the caissons were erected at the high south bank as water-tight chambers with 2 ft. of concrete in them as ballast. They were let down a 1 in 7 incline on trolleys for launching in a dredged minimum depth of 8 ft. of water. For extra floatation an air-tight cover was provided over the dredge-holes and air under 2-lb. pressure forced in.

Each of the caissons was then floated to its sinking-site between two pontoons, where it was suspended by six 20-ton differential pulley blocks from a gantry over the pontoons, as an extra precaution. With adequate anchorage of the pontoon set, the caisson was lowered in about 27 ft. of water by building the height of the caisson to half the depth of water with four 7-ft. strakes. Bed-erosion was prevented by spreading a layer of ballast.

As each strake was added concrete was filled until the cutting-edge was sunk to 1 ft. above the bed, when 1-cu.-



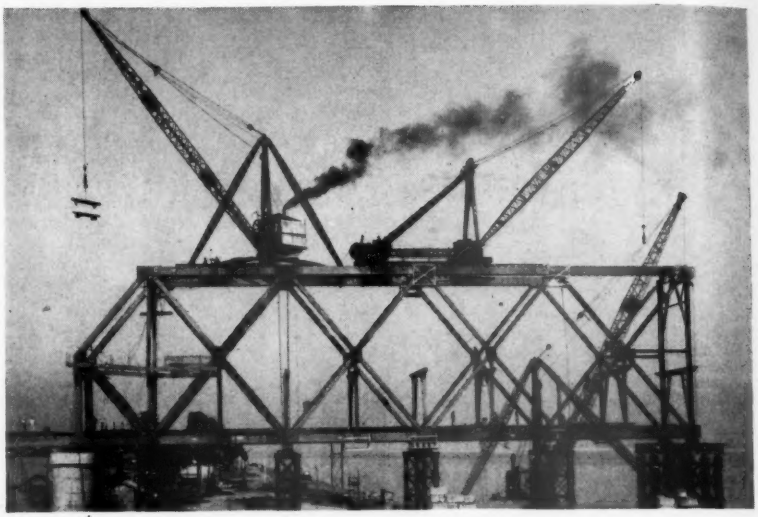
Railway approach span (left) and erection of No. 1 main span begun on false-work

ft. concrete blocks were superimposed as required for correct siting and grounding. Concreting was then resumed. Tilting during the sinking was corrected in the usual manner; the maximum tilt permissible was 1 in 100, but actually none exceeded 1 in 117 in the water-pier well foundations. Only in the last 10 ft. or so was kentledge consisting of about 600 tons of sandbags required, the maximum sinking effort being 7·5 cwt. per sq. ft. After the well had sunk to its final level a series of charges of gelignite were detonated in the dredge-hole, care being taken to insure that a 4-ft. cushion of water was provided between the charges and the cutting edge. This measure was taken to shake the well and loosen itself to allow of final settlement.

After an interval of 8-10 hr. from the final detonation the bottom plug was placed by lowering specially-designed skip-boxes in which the bottoms opened automatically as they touched bottom. Careful checks were made to insure even deposit. Sand-filling in water followed to secure a compact mass as a core to the well, and finally the top plug was laid and on it, with suitable reinforcement, the top raft was cast. No stone pitching is being provided round the piers.

Girder Erection

Girder-erection has now begun, No. 1 span at the south bank being erected partly on falsework, as illustrated, and partly by the cantilever method of launching. The landward part as far as panel-point No. 9 is temporarily carried on steel trestling, but the support at that point is on screw-piling. The bottom chord is being erected, riveted and cambered on jacks, and the upper steelwork with Scotch derricks, one on the top chord having a special bogie. The other spans will all be erected by cantilevering them out from adjacent spans complete except for the roadway cross-girders and stringers. Some of the members are having to be temporarily strengthened and additional members will also be required to resist the abnormal strains imposed during the cantilevering.



Girder erection of No. 1 span to panel point No. 9 on falsework with Scotch derricks ; the leading one is a special 15-ton Arrol aluminium crane which will also be used in future cantilever launching

Engineering Work in Peascliffe Tunnel, Eastern Region

Relaying, reballasting, and lowering track

PEASCLIFFE TUNNEL, a 970-yd. double-line tunnel on the East Coast main line, is situated about three miles north of Grantham. Early in 1957 it was decided to renew the track and ballast in the down line through the tunnel and to improve the drainage, as trouble had been experienced with the track circuits due to the wet ballast conditions. It was further decided to lower the track levels so as to improve clearances for future electrification.

Possession of both tracks was obtained for periods of 24 hr. on three successive Sundays, and the length of track dealt with on each occasion was approximately 400 yd., including track-lowering at each end of the tunnel. The temporary speed restriction lasted for a period of 31 days.

The relaying was carried out by Eastern Region twin-jib tracklayer and the new track was installed with 109-lb. F.B. rails, W.M. baseplates with spring clips and Jarrah sleepers.

The ballast was excavated to 1 ft. 3 in. below sleeper allowing an approximate lowering in rail level of 4 in. The excavation was carried out by three 10 R.B. excavators with skimmer buckets, and the spoil was loaded into wagons standing on the adjoining line.

Preliminary investigation showed that the ballast was very hard and a heavy scarifier unit was used to break up the ballast before the excavators started work. The track was then reballasted with ¼-in. granite ballast.

The crawler scarifier unit was supplied by the David Brown Industries Limited, and the excavators by Derek Crouch (Contractors) Limited. The four machines were conveyed to and from the site by low loader wagons each weekend, and were unloaded and loaded on a temporary sleeper ramp at the end of the tunnel.

The work was carried out by district labour under the supervision of the Peterborough District Engineer, Mr. J. H. Glendinning.

David Brown "50 TD" tractor being unloaded off the low-loader

ELECTRIC RAILWAY TRACTION SECTION

Electrification Deferred in East Africa

DECISIONS in favour of diesel or electric traction rarely command universal agreement, and now that electricity can offer industrial frequency systems, some advocates of electrification are tempted to feel that a choice in that direction should be a foregone conclusion. The Motive Power Report, 1957, of the East African Railways & Harbours, prepared by Mr. J. Hudson, Chief Mechanical Engineer, and Mr. G. P. G. Mackay, Chief Operating Superintendent (referred to briefly in our November 22 issue), presents the results of a detailed study of the merits of electrification—3,000-V. d.c. and 25-kV., 50-cycle a.c.—and of diesel-electric traction for the Mombasa-Nairobi-Nakuru sections of the main line, and reaches the conclusion that diesel-electric traction with 15 large and eight medium locomotives should be the form of motive power to be introduced for the present between Nairobi and Nakuru. We are indebted for a copy of this closely-reasoned and detailed analysis of the position to Mr. J. R. Farquharson, General Manager, East African Railways & Harbours. Although the Nairobi-Nakuru section is the more favourably situated as regards electric power supplies, and it is estimated that, with a 50-cycle system, annual operating costs in 1963 would be slightly lower than with diesel-electric power, it is considered "wrong in every way" to operate with electric traction on this comparatively short section while using diesel traction between Mombasa and Nairobi, where no annual saving in respect of electric traction is estimated until about 1970. For the whole main line between Nakuru and Mombasa, the corresponding date would be 1969. To quote the report: "When considering the merits of electrification or diesel-electric traction in 1957, as we are now doing, 1969 is a long way ahead and the balance in favour of present day and mid-future economy rests with diesel-electric traction.

Preoccupation with the characteristics of motive power makes it easy to forget that in planning an electrification, the availability of adequate and economic electricity supplies is a fundamental necessity. In East Africa, the report states, although there is a comparative abundance of hydro-electric power, it is unfortunately remote from the sections of the railway on which it could be most advantageously employed. This factor, as it affects the Nairobi-Mombasa section in particular, has been paramount in reaching the decision not to electrify at the present time. The position is very different from that in the Belgian Congo, where the 50-cycle electrification between Jadotville and Tenke, and its subsequent extensions, were facilitated by the proximity of existing high-voltage lines interconnecting hydro-electric power stations, so that one substation on the initial section could be located in a substation of the electricity supply undertaking, while the other was built at a point where the high-voltage line crossed the railway route. The possibility of siting railway substations close to those of the Central Electricity Generating Board grid network was emphasised in the British Transport Commission survey of 50-cycle electrification for the Euston-Manchester-Liverpool lines.

As regards electric motive power, the report has assumed a 3,000-volt d.c. locomotive of about 100 tons, or a 25-kV., 50-cycle, Bo-Bo locomotive of 72 tons. Permanent way limitations would prevent the use of an a.c. Bo-Bo design of fully comparable performance with the d.c. Co-Co, and even the 18-ton axle loading of the proposed a.c. locomotive would exceed to some extent the rail stress limits laid down at present for the 80-lb. track between Nairobi and Nakuru. A total cost of £80,000 is quoted for both types. Capital costs of the electrification, based on recent quotations by major British firms, show some advantage in the a.c. system for both sections of the main line which were studied. For Nairobi-Nakuru (113 miles), the a.c. figure of £2,970,000 compares with £3,413,000 for a 3,000-V. d.c. system, both assuming the date of electrification to be 1963. For Mombasa-Nairobi (330 miles), in 1968, the gross total with a.c. would be £10,363,000 and with d.c. £11,703,000. These figures include three-phase transmission lines, which would account for £2,900,000 in a d.c. scheme and for £2,243,000 with a.c. electrification. Estimated capital costs of overhead contact line equipment are given as follows:—

—	3,000 V. d.c.	25 kV. a.c.
Nairobi-Nakuru	£1,000,000	£930,000
Nairobi-Mombasa	£2,730,000	£2,530,000

The above figures assume an 0·25 sq. in. contact wire for both systems, together with an aluminium feeder to increase the overall conductivity in the d.c. scheme, and an aluminium return current conductor in the a.c. electrification, to reduce interference with communication circuits.

While concerned primarily with present conditions and basing its conclusions on them, the report acknowledges the changes taking place in traction systems. Therefore, in stating that present evidence would not make electrification from Mombasa to Nairobi a serious consideration for the next ten years, it recommends that a further study of the position should be made about 1962-63. By that time it is possible that developments favourable to electrification may have emerged from the work already well advanced in France and now being undertaken on British Railways. Already efforts have been made in various directions to increase the line capacity while still using steam power, including the acquisition of the most powerful steam locomotives—Beyer-Garratts—to operate on a metre-gauge railway, and the conversion of all engines to oil-burning, so giving greater availability and better performance. As converson to diesel power proceeds, the steam locomotives displaced will be re-deployed, and the measures taken to modernise them will ensure a continuing useful life.

Rhodesia Electrification Report

IT is reported that a study of motive power requirements of the Rhodesia Railways by two British firms of consulting engineers has resulted in electrification being recommended for the Kitwe-Kafue section in Northern, and the Salisbury-Bulawayo section in Southern, Rhodesia. If the recommendation is adopted, it is suggested that these schemes should be completed by 1962 and 1965 respectively, at an estimated total cost of £23,500,000. The consultants concerned, Messrs. Freeman, Fox & Partners and Messrs. Merz & McLellan, are stated to have based their proposals on the forthcoming availability of hydro-electric power from the Kariba scheme, which by 1962 will be supplying the areas involved.

It appears, therefore, that the choice facing the railway administration will be between d.c. and a.c. electrification rather than between alternative forms of motive power. In such a choice the consultants have no doubt been in a position to give matured advice, for it will be remembered that Mr. H. C. Barton and Mr. E. L. E. Wheatcroft of Messrs. Merz & McLellan submitted a paper to the Institution of Electrical Engineers on the potentialities of industrial-frequency traction, with special reference to overseas schemes as early as 1955. Rhodesia has already done much to increase the capacity of single-line sections by large schemes of C.T.C. using equipment supplied by British signal engineering firms. A future in which electric traction and C.T.C. may be complementary means to the same end would offer undoubted possibilities to the British electric traction industry, now that this has a home proving ground for the development of 50-cycle practice.

Progress of Electrification in the Eastern Region

Civil and electrical engineering work on Colchester-Clacton-Walton lines

Alresford Station, showing overhead structures in the station area

CIVIL and electrical engineering work in preparation for the electrification of the Colchester - Clacton - Walton lines, Eastern Region, British Railways, is making good progress. The work is due for completion during 1958 and is being carried out on the 25-kV. 50-cycle a.c. system for the immediate purpose of testing the new equipment and multiple unit electric trains in the local services. At a later stage, there will be a link-up with the extension of electrification from Chelmsford to Ipswich.

The civil engineering work has involved the alteration of 22 bridges, the cutting back of station awnings, alterations to the track layout at certain stations, provision of load gauges and notices at 26 level crossings, lengthening of sidings at Colchester and Walton, and the provision of an additional siding at Clacton. The steam locomotive shed at Clacton is being adapted as an inspection and maintenance depot for electric rolling stock and a carriage washing plant will be installed. Temporary shed accommodation for steam locomotives and two small buildings for staff accommodation have been provided.

Of the 22 bridges to be altered, six public road bridges required reconstruction, three occupation bridges required raising and seven footbridges needed replacement or raising to provide the necessary clearance for the overhead electrical equipment, and the parapets of all 22 bridges had to be raised to conform with statutory regulations.

All bridge raisings have been completed and the raising of the parapets of all overbridges has been carried out, with the exception of Colchester by-pass bridge where, to preserve the appearance of the ornamental balustrade, a special type of canopy will be erected. The larger works, involving bridge reconstructions, have also been completed.

Bridge Reconstruction

The reconstruction of Ipswich Road bridge, Colchester, is of particular technical interest. This was a skew brick arch bridge with a single span of 55 ft. Because of the proximity of a level crossing, the wire height will be higher than would be normally required. This has necessitated raising the level of the road, but to keep this to a minimum, a special type of pre-stressed concrete deck, which was first used at Cooks Green overbridge, also on this line, was again employed.

The deck consists of pre-tensioned pre-cast concrete "I" beams, 18 in. wide by 14 in. deep, side by side, supported from the arch. Rubber cores are positioned longitudinally between the pre-cast beams to form cable ducts and high quality in-situ concrete placed to encase the "I" beams and cores. When the concrete is sufficiently hardened the cores are withdrawn and 32 high-strength steel wires 0·276 in. dia. inserted in each duct. The wires are then post-tensioned in pairs, by the Magnel-Blaton system and the ducts grouted with cement grout under pressure. The resulting deck, although only 22 in. deep, is capable of carrying the prescribed Ministry of Transport load with an adequate reserve strength.

The bridge was stripped of its road surfacing and spandril fill down to the brick arch, but because of the height of the arch, the deck had to be cast 1 ft. 9 in. higher than its final position. After the demolition of the arch the whole of the deck and cill beams were lowered, in two halves, by the use of jacks, into their final position. During

Ipswich Road Bridge, Colchester, after demolition of arch and before deck was lowered into final position

construction, the road was closed, half at a time, to all vehicular traffic. The abutments of the bridge are finished with sand-faced engineering bricks with artificial stone quoins.

The station awnings at Colchester, Wivenhoe, Alresford, Great Bentley, Kirby Cross, Frinton, and Clacton have been cut back to provide lateral clearance for the overhead electrical equipment. The awning at Frinton, being of concrete, was cut back by the flame of a thermic lance; the first time this method has been used on the Eastern Region.

Permanent way alterations have been completed at Hythe Junction, Wivenhoe, Great Bentley, and Thorpe-le-Soken, and work is in progress at Colchester, Clacton, and Walton.

At Stanway, the sidings have been considerably enlarged and remodelled and provided with road access to furnish a depot and storage space for steel masts, drums of catenary and contact wire, and other material for the contractor erecting the overhead line equipment. Fourteen sidings have been laid in covering an area of some 12 acres.

Overhead Line Equipment

Installation of overhead line equipment was commenced in March, 1957. By the end of October, only a few foundations were outstanding and some 40 per cent of the supporting structures had been installed. The erection of the overhead line equipment conductors was commenced at the end of October in the section between Wivenhoe and Alresford and was preceded by the fitting to the masts of the cantilever assemblies which support the conductors.

Simple catenary construction is employed using a 19/0·083 in. stranded cadmium copper catenary, and a 0·166 in. single cadmium copper contact wire attached to the catenary by droppers. The major portion of the overhead system will be of the automatic tension type, tensioning being applied by balance weights. At all terminal stations where running speeds are low, fixed tension simple catenary equipment will be installed.

The structures supporting the overhead line equipment are mainly of three types: B.F.B. (Broad Flange Beam) section, fabricated lattice, and fabricated welded rod. On open route sections of the double line track the great majority of structures consist of separate B.F.B. masts acting as single track cantilevers for each track With automatic tensioned equipment, the structure spacing is up to a maximum of 240 ft.; this spacing being reduced to a maximum of 210 ft. where fixed tensioned equipment is used. All overhead line equipment structures are galvanised.

Overlap spans and neutral sections are being provided at convenient points along the line, which is thus sectioned electrically, not only at the feeder station and track sectioning cabins, but also by switches at certain strategically placed overlap spans. The a.c. feeder cables from the feeder station will be laid in concrete troughing at surface level to their respective switches mounted on the neutral section structures.

Foundation work and erection of the supporting structures in open country sections of the line is being carried out with the aid of the earth boring, steel erection, and concrete mixing units. At locations where steel was available at the time when foundation work was carried out, the method of construction evolved on the Eastern Region electrification of the Shenfield-Chelmsford and Southend lines was employed. This enabled the entire process of excavation, mast erection, and concreting to be performed in sequence during one operation.

Electrical energy at 25 kV., single-phase, 50 cycles, will be supplied direct by the Central Electricity Authority, Eastern Division, to Colchester feeder station, situated about a quarter of a mile from Colchester passenger station. This supply will be transmitted to the feeder station by means of two 400-A. 10-MVA. concentric type 25-kV. single-phase cables which will be connected to two 7½-MVA. 132/25-kV. single-phase transformers at the Colchester C.E.A., Eastern Division, substation.

At Colchester feeder station the two Central Electricity Authority 25-kV. single-phase cables will be connected to a three-section 15-panel switchboard. This switchboard incorporates two 300-MVA. incoming-supply single-phase oil circuit breakers from which the single busbar will be fed. Two bus section switches will be connected on the busbar making the three-section busbar switchboard. Also on this switchboard will be the 150-MVA. 25-kV. single-phase track feeder oil circuit breakers for supply to the Colchester-Clacton line and eventually to the main Colchester-Ipswich lines.

Alresford, Thorpe-le-Soken and Clacton track sectioning cabins will parallel all sections of the overhead line conductors by means of 150-MVA. single-phase oil circuit breakers similar to those installed at Colchester feeder station.

Supervisory Control

As the scheme is a pilot electrification project, a temporary supervisory control station will be provided adjacent to Colchester feeder station. From this control station, the circuit breakers in the feeder station and track sectioning cabins will be remotely controlled with eight power-operated switches which are to be erected at various locations along the line on the overhead equipment structures. Specially screened star quad pilot cables for the remote control of track switches

(*Continued on page* 79)

Wiring train working between Alresford and Wivenhoe, adjusting cantilever assemblies

Section of line, showing partially adjusted simple catenary balance-weight tension equipment

Electric Traction in the Calcutta Area

Dealing with greatly increased traffic: economic advantages

(*By a correspondent*)

ELECTRIC railway traction in India began in 1925 with the conversion of Bombay suburban lines of the broad-gauge Great Indian Peninsula Railway; this electrification was later extended over the main lines to Poona and Igatpuri. The Bombay, Baroda & Central India Railway began to convert its broad-gauge Bombay suburban lines in stages in 1928. In 1931, the metre-gauge Madras suburban line of the South Indian Railway was electrified from Madras Beach to Tambaram. Electrification in Eastern India has been considered from time to time since before the first world war, but was deferred, largely because of the ready accessibility of locomotive coal in the Bengal and Bihar coalfields.

Suburban traffic in the Calcutta area, however, underwent a complete change during the second world war, when the transport needs of Calcutta, as a hub of war activity, grew beyond what could be met satisfactorily by steam traction. The idea of developing electric traction on the main line and the suburban network began to take shape. After Partition in 1947, followed by an unprecedented increase in the population of Calcutta and its suburbs, the strain on the railway increased still further. It became clear that steam haulage had reached the limits of its capacity and that main-line electrification was indispensable to carry the additional traffic expected under the Second Five-Year Plan.

Preliminary Study

In 1953, the Railway Board appointed a committee of officers to undertake a thorough study of the economics of railway electrification in the Bengal and Bihar industrial areas. This committee drew attention for the first time to the potentialities of electric traction in the light of the steadily rising traffic on trunk routes, the increasing cost of Indian coal, the availability of electric power at reasonable rates from the Damodar Valley Corporation and other multi-purpose projects concerned with the development of power and irrigation, which had been installed in Eastern India.

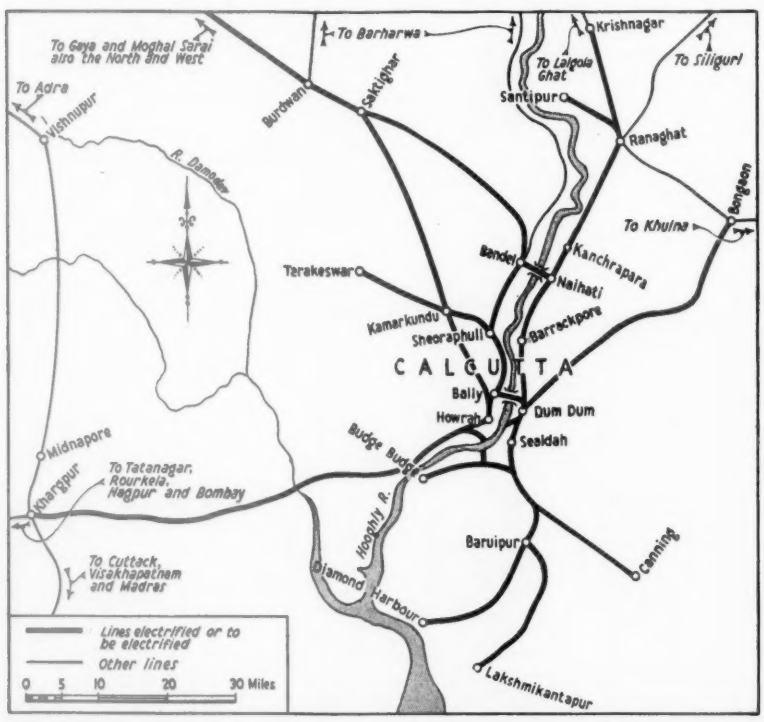
The report of the committee showed not only that electric traction would pay substantial dividends on capital invested, but also that it offered a workable solution for eliminating congestion on the Eastern and the Bengal Nagpur (now South Eastern) Railways, that had risen from the rapidly increasing pace of industrialisation. The Government of India decided accordingly to sanction the Calcutta Electrification Project, with which a beginning has just been made.

The decision to introduce the 3,000-V. d.c. system in the Calcutta area was taken in 1954. Subsequently, it was held that it would have been better to adopt the 25-kV., 50-cycle a.c. single-phase system, which has been selected for adoption for all new electrification. If the savings in capital expenditure with the a.c. system are even of the order of 5 per cent, the total savings may constitute a substantial figure in the context of the large-scale electrification which India is now embarking upon. The Railway Board recently appointed a technical committee to investigate the merits of the two systems and that body concluded that there was almost an equal volume of opinion in favour of either system amongst railway officers.

A study of the density of suburban traffic in the Calcutta area showed that within the 15-mile zone, it was the heaviest on Howrah-Burdwan and Sealdah-Ranaghat section, being 44,500 and 45,000 per mile per day respectively. As the Howrah-Burdwan section has also to deal with a large number of through passenger and goods trains between Howrah and Moghalsarai, the number of which is likely to increase rapidly, it was decided to start electrification on this section. Besides the Howrah-Burdwan section (59 miles), the branch between Sheoraphuli and Tarakeswar (20 miles) is also being electrified in the first stage. This avoids a change for the Calcutta-bound passengers from steam to electric trains at Sheoraphuli, for their short journey of 14 miles between this junction and Howrah. Against the existing 35 trains each way running daily on the Howrah-Bandel and Howrah-Tarakeswar sections, plans are in hand to provide ultimately a daily srevice of 90 trains each way. Electrification will also help in relieving congestion in Calcutta by dispersal of the population to the suburbs.

The 3,000-V. d.c. system is new to India, but except for the problems associated with the higher voltage, the system is not materially different from the 1,500 V. d.c. now in use in the Bombay and Madras areas.

The equipment had, however, to be mostly imported, as Indian industry has not yet developed to any appreciable extent in manufacturing electric rolling stock and equipment; but the scheme is being carried out and administered wholly by Indian engineers.



Main-line railways in the Calcutta area. All electrification other than between Howrah and Burdwan and Tarakeswar (which is at 3,000 V. d.c.) will be at 25 kV., 50 cycles

Contracts for equipment were distributed amongst a large number of manufacturers, including Metropolitan Vickers, British Thompson Houston, English Electric, Metropolitan Cammell, and Hackbridge & Hewittic Electric of the United Kingdom; M.A.N., A.E.G. and Siemens Schuckert of Germany; S.I.G. of Switzerland; S.A.E. and Magrini of Italy; Hitachi of Japan; and Jessops, Chanda Engineers, Kamani Engineering, Consolidated Construction, Indian Cable, Kushumika Iron Works, Kirorimal Mulamal & Sewagram Brothers of India.

The distribution of work amongst a large number of contractors, and the lack of trained personnel, resulted in serious difficulties. The temporary shortage of shipping caused by the Suez crisis retarded work by about six months. Originally, it was the intention to start electric working with multiple-unit stock, but this was not possible, as the first unit was not shipped till the beginning of October, 1957. The delay in the arrival of the coaches has prevented the Eastern Railway from immediately replacing all the steam engines working on the route on which electric traction was inaugurated by the Prime Minister, Mr. Jawaharlal Nehru, on December 14. A beginning had, therefore, to be made with running a limited number of suburban trains with electric locomotives.

The locomotives are capable of hauling a 630-ton passenger train at 70 m.p.h. and a freight train of 2,600 tons at 43 miles per hour. Those supplied by the English Electric Co. Ltd.—the first to be commissioned for service in India on the 3,000-V. system—were described in *The Railway Gazette* of December 20, 1957.

Supply Points

Each supply point was originally designed to supply power to a number of traction sub-stations and thus help to obtain a good load factor and to reduce the traction peaks by introducing diversity of demand. The various sizes adopted for the different routes were dictated by the consideration to limit the voltage drop to some 7 per cent with only one circuit in service.

Economic Advantages

There are many advantages to be gained by the large-scale electrification that India has decided on. Electrification will result in the displacement of a large number of steam locomotives, which will be used in areas with high traffic density. The Indian railways have still to carry a large number of over-age steam locomotives which will be gradually replaced by those released from electrified lines, instead of imported steam locomotives for which foreign exchange is not readily available. It has been estimated that an expenditure of about Rs. 18 crores will be avoided by the railways on account of non-purchase of rolling stock. The expansion of electrification will also help to reduce the requirements of coal, at a time when a huge increase in production has to be achieved for feeding the industries being developed under the Second Five-year Plan. As a direct result of the reduced consumption of coal by railways, there will be easing of pressure on railway capacity, a good deal of which is now used for transporting coal used for their own operation.

Considerable economies are also expected to accrue. It is generally accepted that the thermal efficiency of a steam locomotive is about one-fifth of the efficiency of a stationary thermal plant, and allowing for the losses in transmission from power station to the driving wheels of an electric locomotive, a steam locomotive will be found only about one-fourth as efficient as an electric locomotive in terms of coal consumption. With the further increase in the size of modern power stations and the development of modern technique, the disparity in thermal efficiency will be even more marked. For the Calcutta suburban sections, east of Burdwan alone, the annual saving of expenditure, after introduction of electric traction, has been assessed at approximately Rs. 65 lakhs. On the earnings side, these sections are expected to yield an additional Rs. 282 lakhs annually.

What is more important, however, is that the new power stations are designed to use very inferior coal for which normally there would be no other demand, whereas steam locomotives need fairly high-grade coal. Basically, therefore, the case for electrification in India, with its limited reserves of high grade coal, is both urgent and inescapable.

The difficulties which have been faced hitherto have been financial, as the fixed equipment such as catenaries and sub-stations constitutes a very substantial proportion of the total costs of electrification. Its cost, however, does not vary appreciably over wide ranges in traffic density. The process of the expansion of traffic on Indian Railways, which began during the last war, has continued through the First and the Second Plan periods. It has now been estimated that the density of traffic at the end of the Second Plan will have far outstripped the optimum figures, above which electric traction becomes cheaper. With further economies in the savings on funds needed for improvements in line and terminal capacity in the absence of electric traction, which will obviate the need for costly engineering works, such as doubling and provision of more block stations, it is expected that over the Eastern Railway a return of 15 per cent will accrue on the capital expenditure incurred, outside the suburban area.

Further Electrification Plans

Electrification at 50-cycles during the Second Five-year Plan will cost over Rs. 100 crores and will include, besides the Calcutta suburban area, the Burdwan-Moghalsarai section (352 miles) of the Eastern Railway; Asansol-Rourkela (186 miles) of the South Eastern Railway; Igatpuri-Bhusaval (191 miles) of the Central Railway; and (all the foregoing being broad gauge) Tambaram-Villupuram (83 miles, metre gauge) of the Southern Railway.

The Grand Chord line between Asansol and Moghalsarai, on the Eastern Railway, via Gaya, forms the main artery for the flow of cross-country traffic between the Calcutta area and the Northern, Central, and Western parts of the country. This section is at present used up to its full capacity, and for some years now the overflow of traffic has been diverted via Patna over the "Main Line"—a route longer by 51 miles.

Similarly, the Asansol-Rourkela section of the South Eastern Railway not only forms part of the direct cross-country route from West to East connecting Bombay and Calcutta, the two largest cities of trade and centres of industry in the country, but also serves the centres of iron and steel production at Tatanagar and Rourkela, and will carry iron ore and limestone traffic for the other steel plants at Durgapur and Bhilai. It is considered that though the plan may appear ambitious, it represents the bearest minimum of mileage that should be electrified to enable Indian Railways to carry the Second Plan traffic.

Progress of Electrification in the Eastern Region

(*Concluded from page* 77)

and the oil circuit breakers at Alresford, Thorpe-le-Soken, and Clacton will be laid in concrete troughing alongside the line with the signal and telecommunication cables.

When the main line to Ipswich is electrified it is intended to dispense with the temporary control station at Colchester and to control power distribution from a main control room established elsewhere for dealing with the area as a whole.

The supply for signalling will be provided for the Signal Engineer at Colchester feeder station and Thorpe-le-Soken track sectioning cabin. These supplies will be derived from two sources, namely the local supply network and by transformation from the 25-kV. single-phase traction supply. The latter supply will be regulated to cater for variations in the traction supply voltage.

The civil engineering work is under the general direction of Mr. A. K. Terris, Chief Civil Engineer, Eastern Region, and the electrical engineering work under the general direction of Mr. K. J. Cook, Chief Mechanical & Electrical Engineer, Eastern Region. The main contractor for the electrical engineering work is British Insulated Callender's Construction Co. Ltd., and for bridge reconstruction work, Wellerman Bros. Ltd., and W. & C. French Limited.

Modifications to Driver's Brake Valve

Reduced maintenance of electro-pneumatic brake controllers on L.T.E. rolling stock

TO minimise the maintenance of electro-pneumatic brake controllers on London Transport rolling stock, three controllers have been fitted experimentally with poppet valve driver's brake valves. Inspection of the components after over 12 months' service, have shown them to be in perfect working order.

The standard rotary valve of the electro-pneumatic air brake system in use on L.T.E. coaches requires regular lubrication and skilled maintenance, as its face must have a perfectly smooth finish. On the three experimental controllers, the rotary valve has been replaced by four cam-operated poppet valves, arranged so that the brake handle positions correspond with those of the standard controller.

As may be seen from the accompanying diagram, the port plate casting (8) houses four rubber seated poppet valves (11) mounted vertically; these are held upwards to their seats by springs (12), and the valve stems, which project from the air chamber of the casting (10), are sealed by synthetic rubber O-rings (9). Operation of the valves is through rockers, fitted at the free end with rollers, by a circular face-cam plate (5) mounted above the valves and attached to the driver's brake spindle (1). If it is necessary to remove the valves, they are accessible from the under side of the port plate casting.

Sequence of Operation

The sequence of valve operations, through the driver's brake controller handle, is as follows:—

Position I (*Release*) *and Position II* (*Full*)—Valves "A" and "B" closed, valves "C" and "D" open, allowing air from the main reservoir to pass to the equalising reservoir and train line pipe.

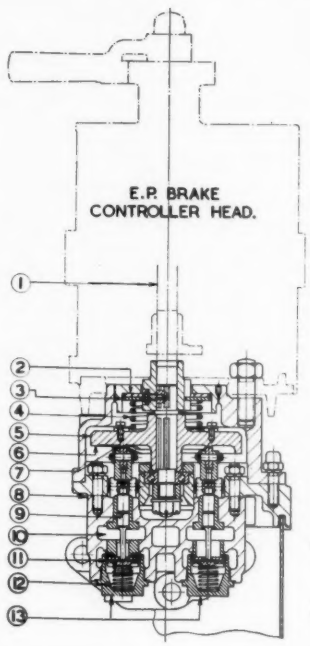
Position III (*Lap*)—All valves closed.

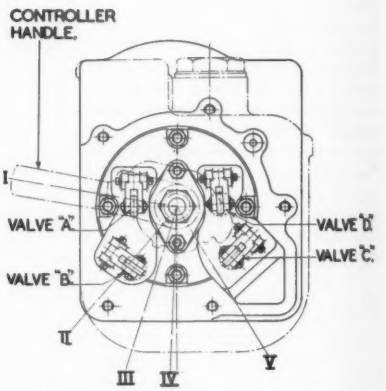
Position IV (*Pneumatic service application*)—Valves "B," "C" and "D" closed, valve "A" open, exhausting air from the equalising reservoir via a choke.

Position V (*Emergency application*)—Valves "C" and "D" closed, valves "A" and "B" open, exhausting air from the equalising reservoir and train line pipe.

During the period in which the experimental brake valves have been in service, it has not been found at all necessary to carry out maintenance on any of them, and the wear on moving parts is reported to have been negligible.

The poppet valve driver's brake controller has been developed by the Westinghouse Brake & Signal Co. Ltd. to the requirements of Mr. A. W. Manser, Chief Mechanical Engineer (Railways) of London Transport. The three modified controllers are fitted in three different types of rolling stock; one each in a "P" stock car (Circle Line), an "R" stock car (District Line), and a "1938" Tube stock car (Piccadilly Line).





1. Driver's brake valve spindle
2. Friction washer
3. Friction plate
4. Friction plate spring
5. Face cam plate
6. Outer cam (controlling valves "B" and "C")
7. Inner cam (controlling valves "A" and "D")
8. Port plate casting
9. Rubber O-ring
10. Air chamber
11. Rubber seated valve
12. Valve spring
13. Valve caps

Above: Plan of modified valve, with face cam plate removed

Left: Section through poppet-valve driver's brake valve

UNIVERSITY SCHOLARSHIPS IN CIVIL ENGINEERING.—A scheme to award up to 20 scholarships in civil engineering, valued at between £300 and £400 a year, to boys from families with incomes marginally in excess of £2,000 a year who might not otherwise be able to go to university, is to be sponsored jointly by three professional bodies in civil engineering. Sir Arthur Whitaker, President of the Institution of Civil Engineers, which is sponsoring this scheme jointly with the Association of Consulting Engineers and the Federation of Civil Engineering Contractors, announced the scheme recently. He was speaking at a conference of school careers masters held at the Institution in London in collaboration with the Public Schools Appointments Bureau. He stated that it seemed that endeavours to create equality in educational opportunity had penalised the children of the large number of married people in Britain whose joint income was marginally in excess of £2,000 a year. Although the children might win State scholarships to pay for university tuition fees, grants for living expenses were reduced in their case to negligible proportions. It often meant that a boy was deprived of a university education. This was a serious loss to professions such as engineering, which drew 75 per cent of its intake from the universities. For this reason the three bodies had drawn up a scholarship scheme for such boys. As a start they were considering offering up to 20 scholarships. Details of the scheme are being worked out.

MASS PLEADING GUILTY TO NON-PAYMENT OF FARE.—At Bow Street Magistrate's Court, London, W.C.2, last week, all the defendants summoned for travelling by rail without previously paying their fares, with intent to avoid payment, are reported to have sent in a Form 903, pleading guilty. This was in accordance with the new Magistrates' Court Act, 1957. There were, therefore, no ticket collectors as witnesses, no prosecuting counsel representing the British Transport Commission or London Transport Executive and nearly no costs. Particulars on the 903s were read by a ticket inspector. The defendants' letters were read out by the Magistrate's Clerk, and the Magistrate, Mr. Geraint Rees, imposed the fines. Finally he added 5s. costs to each of the penalties.

IMPROVEMENT SCHEME FOR B.R.S. DEPOT AT BROMFORD, BIRMINGHAM.—British Road Services are to undertake a large-scale programme of development at their general haulage depot at Bromford, Birmingham. The work will include re-siting of the depot entrance; construction of a new fuelling island; additional surface parking areas; and improved staff amenities. Bromford Depot is the principal B.R.S. depot in Birmingham; it is planned to make it the only solely general haulage B.R.S. depot in the city.

RAILWAY NEWS SECTION

PERSONAL

Mr. Eilif I. Froshaug, Manager of the Norwegian State Railways Travel Bureau, whose impending retirement was recorded in our December 27 issue, will remain in office for the time being.

Mr. B. W. Roberts, O.B.E., D.C.L., Vice-President of Purchases & Stores for the Canadian Pacific Railway in Montreal since 1947, whose retirement took place on December 31, joined the C.P.R. in Winnipeg in 1907 in the Treasury Department. The following year he transferred to the Purchasing Department at Vancouver, he was appointed Assistant Purchasing Agent, Winnipeg, in 1912; Assistant to the General Purchasing Agent, Montreal, in 1913; Purchasing Agent, Calgary, in 1917; Assistant General Purchasing Agent, Montreal, in 1923; General Purchasing Agent, in 1928, and Vice-President, Purchases & Stores early in 1947. He is also active in community life and is Chairman of the board of governors of Sir George Williams College, a member of the Metroplitan Board of the Y.M.C.A., and Governor of the Montreal General Hospital and Queen Elizabeth Hospital. He is a Past President of the Boy Scouts Association, Province of Quebec, Past President of the Montreal Rotary Club (1933-34), and Past President of the Canadian Railway Club, Montreal (1936). Mr. Roberts was a member of the old Royal Flying Corps (later the Royal Air Force) in 1917-18, and for his services in the 1939-45 war, during which he was Director of Purchases in Canada for Navy, Army and Air Force Institutes supplying canteen needs for the British service personnel, he was recognised in the Birthday Honours List of 1946 when he was awarded an O.B.E. For his contributions to higher education and community welfare, Mr. Roberts received the honorary degree of D.C.L. from Bishop's University, Lennoxville, Quebec, in 1954.

Mr. B. W. Roberts
Vice-President, Purchases & Stores,
Canadian Pacific Railway

Mr. F. J. Fryer
Appointed Chief of Transportation
Canadian Pacific Railway

Mr. M. D. MacNair has been appointed Sales Manager of the Canadian Pacific Railway's piggyback services.

Mr. G. Herbert Lash, Assistant to the President of Canadian National Railways, has retired. Mr. Lash, who was educated at the Collegiate Institute and St. Andrew's College, Toronto, began his career with the former *Mail & Empire* in Toronto in 1912. During the 1914-18 war he enlisted with the Princess Pat's and went overseas as a private in 1915. Commissioned in the field where he was wounded in 1916, Mr. Lash was awarded the Military Cross and Bar and mentioned in Despatches. After the war he resumed his journalistic career and was Managing Editor of the *Sunday World* at the time he joined Canadian National Railways as Publicity Representative at Montreal in 1923. Three years later he moved to Winnipeg in a similar capacity and subsequently became Press Representative in New York. He returned to Montreal as Assistant Director of Publicity in 1938 and was appointed head of the company's Public Relations Department in 1950. He became Assistant to the President three years ago. During the last war Mr. Lash served in Ottawa as Executive Assistant to the Censorship Co-Ordinating Committee and, in 1940, became Director of Public Information for Canada to organise and develop this branch of the Canadian war effort. He handled Press arrangements for the Royal Tour of 1939.

Mr. F. J. Fryer, who, as recorded in our December 6 issue, has been appointed Chief of Transportation, Canadian Pacific Railway, began his career with that system in 1916 as a call boy at Medicine Hat. He served as operator at Medicine Hat, Empress, Dunmore, Bassano, and Irvine in the Alberta District before his appointment as Chief Dispatcher at Dunmore in 1931. Appointed Assistant Superintendent at Edmonton in 1941, Mr. Fryer went to Winnipeg in 1943 as Inspector of Transportation, Western Lines. He was Superintendent of the Regina Division and, later, of the Portage Division at Winnipeg, moving to Montreal in June, 1953, on special duties. In December, 1953, he became Assistant General Superintendent of Transportation for the system, which title, on October 1, 1956, was changed to Assistant Chief of Transportation.

Mr. D. J. Howse, Chief Traffic Manager, New South Wales Government Railways, will retire on February 1.

Mr. Charles F. Cleaver
Director, A.C.V. Sales Limited, 1950-58

Mr. C. S. Lock
Press Officer to the B.T.C., 1953-57

Mr. J. A. Lacey
Appointed Dock Superintendent, Middlesbrough, B.T.C.

Mr. Charles F. Cleaver, M.I.C.E., M.I.Mech.E., M.I.Loco.E., who, as recorded in our January 3 issue, retired on January 1 from the boards of A.C.V. Sales Limited and British United Traction Limited, was educated at Llandovery College, South Wales, and the Central Technical College, South Kensington, where he gained the A.C.G.I. diploma. In 1909, after technical experience with various firms, Mr. Cleaver became leading draughtsman at the Walthamstow factory of the London General Omnibus Co. Ltd. (later the Associated Equipment Co. Ltd.). He remained with this company until September, 1914, with the exception of a year spent with Clayton & Company. During the 1914-18 war he served as a lieutenant and later as a captain with the Inspectorate of Mechanical Transport. In the five years which preceded demobilisation he visited the United States to spend some time with the British War Mission, later in the capacity of Deputy C.I.M.T. In 1921 he formed with Mr. H. Nyberg the Four Wheel Drive Motor Company, with which he remained until it was absorbed by the Associated Equipment Co. Ltd. On the formation of A.C.V. Sales Limited, Mr. Cleaver was appointed Railcar Director and later, on the formation of the Railcar Division of British United Traction Limited, he became a Director of that company. For a while he acted as Manager. In 1951 he relinquished the office of Manager, Railcars, but remained a Director of A.C.V. Sales Limited and continued to exercise general oversight and guidance of railcar negotiations for sales both home and abroad, service arrangements, and new design and development.

Mr. F. C. Margetts, Chief Operating Superintendent Scottish Region, British Railways, has been appointed Chief Traffic Manager, North Eastern Region.

Mr. J. C. L. Palmer, who, as recorded in our January 3 issue, has been appointed Education Officer, Training & Education Division, Manpower Adviser's Department, British Transport Commission, was educated at Canford School and Exeter College, Oxford. He joined the former L.N.E.R. as a traffic apprentice in 1937, leaving in 1938 to join Imperial Chemical Industries as Labour Manager, Broughton Copper Works, Salford, Lancs. After war service from 1940 until 1946 with the R.N.V.R., he returned to I.C.I. and, in 1947, joined the London Passenger Transport Board as Executive Assistant in the Staff & Welfare Department. In 1949 he was appointed Senior Executive Assistant, Recruitment & Training Officer, London Transport Executive. Mr. Palmer is Secretary of the National Committee on Road Transport Education, and Joint Secretary of the Advisory Committee for Transport to the Regional Advisory Council for Higher Technological Education in London and the Home Counties. He is a Corporate Member of the Institute of Personnel Management.

Mr. C. S. Lock, Press Officer to the British Transport Commission, who, as recorded in our December 27 issue, has retired, has completed 36 years of railway service. Mr. Lock joined the former Great Western Railway in 1921 and was in charge of the G.W.R. Press Section at Paddington from 1927 to 1939. During the war he was a Deputy Assistant Director of Public Relations with Home Forces and with the C.M.F., and, on re-joining the G.W.R. in 1945, became Press Officer to the company. He was appointed to a similar position with the Railway Executive in 1948 and with the British Transport Commission in 1953.

Mr. P. G. Price, District Goods Manager, Bolton, London Midland Region, British Railways, has been appointed District Goods Manager, Manchester.

Mr. Ralph D. Parker, Vice-President in charge of Canadian operations of the International Nickel Company of Canada Limited, will move his headquarters from Copper Cliff, Ontario, to the company's office in Toronto early this year. Mr. Ralph H. Waddington, Mr. James C. Parlee, Mr. Richard A. Cabell, and Mr. Paul Queneau have been elected Assistant Vice-Presidents. Mr. Waddington has been also appointed General Manager of the Ontario Division and Mr. Parlee, General Manager, Manitoba Division. Messrs. Cabell and Queneau have been elected also as Vice-Presidents of the International Nickel Co. Inc., the U.S. subsidiary of the company.

We regret that, due to a misunderstanding, the photograph reproduced with the biography of Mr. J. A. Lacey in our January 3 issue was not of Mr. Lacey, then correctly recorded as having been appointed Dock Superintendent, Middlesbrough, British Transport Commission.

Mr. E. H. Hopper, who, as recorded in our January 3 issue, has been appointed Training Officer in the Training & Education Division of the Manpower Adviser's Department, B.T.C., entered the service of the former Southern Railway in 1925 as a clerk in the General Manager's Office. After war service with the Royal Engineers from 1943 until 1946, he returned to the Southern Railway in the Labour & Establishment Office, later becoming Chief of that section. In 1949 he was appointed Assistant in the Training & Education Section of the Staff & Establishment Department of the Railway Executive.

Mr. H. L. Butler, A.M.I.Mech.E., A.M.I.Loco.E., who, as recorded in our January 3 issue, has been appointed Assistant Mechanical Engineer, British Railways Central Staff, British Transport Commission, began his transport career with the former Southern Railway in 1929 as a trainee in the Chief Mechanical Engineer's Department. After three years training and subsequent appointments, he joined the Locomotive Testing Section in 1935. In 1942 he was loaned for three years to the United States Army Transportation Corps for duties which included the design and control of production of railway equipment and, on return to the Southern Railway, was appointed Assistant to the Chief Mechanical Engineer, taking charge of locomotive maintenance work undertaken at Motive Power Depots. In 1948 he was appointed Technical Assistant to the Chief Officer for Locomotive Construction & Maintenance at the former Railway Executive and, since 1953, has been Technical Assistant to the Chief Mechanical Engineer of British Railways Central Staff.

Mr. C. F. Havord, Assistant Stores Superintendent, London Midland Region, British Railways, who, as recorded in our January 10 issue, retired on December 31 had spent 43 of his 45 years of railway service

in the Stores Department. He began his career as a junior at Haydon Square Goods Station in London in 1912 and, two years later, joined the Buying Department of the former L.N.W.R. at Euston. At various stages in his career he was responsible for the supply of timber, coal, electrical and signalling equipment, and also served as Deputy and Resident Storekeeper respectively at Crewe and Derby. During the 1914-18 war he served with the London Regiment and was commissioned into its 18th battalion (London Irish Rifles). In 1939 he was seconded to the Ministry of Supply as Assistant Director, R.E. Equipment (Railway Materials).

Mr. Ernest Kirkwood House, Employee Relations Assistant, Canadian National Railways, has been appointed Assistant to the Vice-President, Operations, with responsibility for organisation and employee relations for 84,000 Operation Department employees. Mr. House, who is 50, has spent 32 years in the service of the C.N.R. He joined the company in 1925 as a checker at his home town of Saskatoon and, after holding various clerical positions in the Western Region, was appointed Trainmaster at Regina in 1948, becoming Assistant Superintendent at Saskatoon in May, 1949. The following year he transferred to Melville, Sask., in a similar capacity and became Superintendent at Edson, Alberta, in 1953. He was appointed Employee Relations Assistant at Montreal in 1956.

Mr. John Buchan, General Agent, Express, in London for Canadian National Railways, has been appointed General Express Agent with responsibility for operations in the United Kingdom, Eire, and the Continent. Mr. A. J. Sweetman becomes District Express Agent, London, and Mr. H. E. Adshead, District Express Agent, Liverpool.

Mr. Anthony Head, M.P., has been elected a director of Associated Electrical Industries Limited.

Mr. James Heeps, Assistant Sales Manager (Overseas) of Albion Motors Limited, has retired after 37 years of service with the company.

Mr. L. H. Burton, Manager of the Contract Department of Johnson & Phillips Limited, has retired after over 44 years of service with the company. He has been succeeded by Mr. E. F. Ward, Assistant Contract Manager. Mr. J. Bentley becomes Chief Engineer, Construction.

Mr. A. R. Mathias has been appointed Chairman of the Lead Development Association for the current year, succeeding Mr. H. L. Evans who had held this office since January, 1956. Lt.-Colonel W. E. Grey has been re-appointed Chairman of the Lead Sheet & Pipe Section of the Association.

The following changes will be taking place in the North West area representation of Ransome & Marles from January 1: the Area Manager, Mr. A. P. Gibbs, will take up an appointment at Head Office. Mr. H. V. Willder will then become Manager of the Manchester office, assisted by Mr. E. L. Paton. The Liverpool sub-office manager will be Mr. G. H. Walker, the present Stores Supervisor.

Sir Thomas Spencer has relinquished his position as Managing Director of Standard Telephones & Cables Limited and is succeeded by Mr. F. C. Wright, Assistant Managing Director since July, 1956, and a director of Standard Telephones & Cables Manufacturing Company (Canada) Limited, Kolster Brandes Limited, and Standard Telecommunication Laboratories Limited. Sir Thomas Spencer continues as chairman of the company and its subsidiaries.

Mr. A. Rayner has been appointed Branch Manager at the Oldham office of Thos. Cook & Son Ltd. in place of Mr. E. Horn, who has been transferred to the Manchester (Market Street) office, succeeding Mr. A. Kitchen, who has retired. At a farewell party on December 30, Mr. Kitchen was the recipient of a number of presentations. He had served the company for over 50 years, having joined the Bolton office as a messenger boy in July, 1906, at the age of 13. From October, 1924, to February, 1928, he managed the office at the Midland Hotel in Manchester, and then returned to Bolton as Manager. He was transferred to Market Street in April, 1949. His son, Mr. Eric Kitchen, who joined the company in 1938, was recently appointed Manager at the newly-opened office at Watford.

Mr. A. H. Jarrett has been appointed Clerk-in-Charge at the Romford Office of Dean & Dawson Limited on the resignation of Mr. A. J. Oswick.

Mr. T. Worsnop, Manager of the Engineering Department of Ransomes & Rapier Limited, has retired after 43 years of service with the company.

Mr. Ivor Lloyd and Mr. B. C. Gotelee have retired from the board of the Expert Tool & Case Hardening Co. Ltd.

Mr. J. M. Robb, Manager of the Overseas Division of Expandite Limited, left the United Kingdom for a tour of Scandinavia on January 13.

Mr. J. L. Harrison has been appointed Technical Sales Manager of Davy British Oxygen Limited and Mr. K. T. Brightman becomes Assistant Technical Sales Manager. The services of both men will remain available to British Oxygen Gases Limited for advice on the metallurgical uses of oxygen in the manufacture of iron and steel.

Mr. K. S. Peacock has relinquished the Chairmanship of Guest Keen & Nettlefolds (Midlands) Limited in view of his heavy commitments as Chairman of the parent company. He will continue as a director of the subsidiary. Mr. M. H. Tollit has been appointed Chairman of Guest Keen & Nettlefolds (Midlands) Limited and relinquishes his appointment as Managing Director from the same date. Sir Anthony H. M. Bowlby, Bart., and Mr. A. Atha have been appointed Managing Directors of the subsidiary.

Mr. Albert P. Gagnebin and Mr. L. E. Grubb have been appointed Assistant Vice-Presidents of the International Nickel Co. Inc. Mr. Gagnebin continues as Manager of the Nickel Sales Department and Mr. Grubb, General Superintendent of the Huntingdon Works of the company since 1953, will be in charge of labour relations at all U.S. plants. He will transfer to the company's New York office.

Mr. E. B. James, who joined the staff of the B.E.T. Federation Limited last September with a view to his appointment as Chief Purchasing Officer early in 1958, will assume that position on February 1. Mr. K. C. Wheatley, the present Chief Purchasing Officer, will remain on the staff of the Federation in a consultative capacity until he retires on March 31.

Mr. H. C. Baigent has retired from the board of the A.P.V. Co. Ltd.

Mr. A. J. Orbell, Overseas Technical Representative of Expandite Limited, will leave this country on January 22 to visit distributors in Germany.

Mr. Harold Nuttall has been appointed Managing Director of the English Electric Co. of New Zealand Ltd. He will take up his new position in Wellington at the end of this month.

INSTITUTION OF LOCOMOTIVE ENGINEERS

The following names have been added to the Institution's registers of members:—

Members

Mr. G. C. J. Cattermole, Senior Motive Power Officer, Nigerian Railway.

Mr. S. S. Chakravarti, Chief Mechanical Engineer, Southern Railway, India.

Reinstated as Member

Cdr. (E) J. Peckett, R.N.V.R. (Ret.), formerly Joint Managing Director, Peckett & Sons Limited.

Associate

Mr. N. Reast, Technical Adviser, Tannin Developments Limited.

Associate Member

Mr. J. D. Meacham, Assistant for Materials Handling, Swindon Locomotive Works, Western Region, British Railways.

Graduates

Mr. P. W. Baker, Technical Assistant to Works Manager, Stratford, Eastern Region, British Railways.

Mr. J. W. Carlton, Draughtsman, Hudswell Clarke & Co. Ltd.

Mr. P. Dutta, Trainee, Hunslet Engine Co. Ltd.

Mr. J. R. Endacott, Trainee, Stratford, Eastern Region, British Railways.

Mr. T. D. Hill, Trainee, Stratford, Eastern Region, British Railways.

Mr. V. K. Laroia, Assistant Works Manager, Central Railway, India.

Mr. G. Manasseh, Trainee Engineer, Swindon Locomotive Works, Western Region, British Railways.

Mr. R. B. Mathur, Assistant Mechanical Engineer, Western Railway, India.

Mr. J. P. Richards, Toolshop Fitter, Stratford Locomotive Works, Eastern Region, British Railways.

Students

Mr. A. Lovecy, Apprentice, Stratford Locomotive Works, Eastern Region, British Railways.

Mr. R. W. Sankey, Engineering Apprentice, British Railways, North Eastern Region, Darlington.

Mr. R. N. Seth, Special Class Apprentice, Chittaranjan Locomotive Works, India.

Mr. J. Smith, Fitter, Doncaster Motive Power Depot, Eastern Region, British Railways.

Associate Member to Member

Mr. W. G. Kefford, Partner, Messrs. Ferguson & Palmer.

Graduate to Associate Member

Mr. R. E. Gregory, Diesel Assistant to Motive Power Superintendent, Manchester, London Midland Region, British Railways.

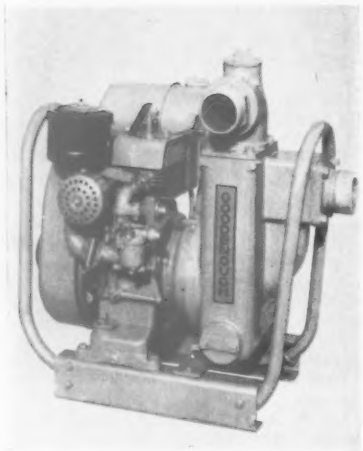
Mr. F. R. Picknell, Technical Assistant to Assistant Outdoor Carriage & Wagon Engineer, British Railways, Southern Region.

Mr. E. A. P. Standen, Mechanical Inspector, Brighton, Southern Region, British Railways.

Mr. E. B. Trotter, Mechanical Draughtsman, Freeman Fox & Partners.

Mr. A. V. Wilson, Technical Assistant, Chief Mechanical & Electrical Engineer's Department, Derby, London Midland Region, British Railways.

NEW EQUIPMENT AND PROCESSES



Self-Priming Pump

THE Model 250 2½-in. automatic self-priming pump has been introduced to the manufacturer's range to meet the demand for a pumping set with a better performance than normal 2-in. pumps at a lower cost from standard 3-in. designs; 2½-in. suction and delivery hoses are also cheaper than 3-in. sizes.

Railway applications include emptying of manholes and ditches, de-watering of trenches and flooded sites, and so on.

Like the other pumps in the range, it is self-priming without manual attention. Once the pump body is filled with water through the orifice provided in the delivery branch, the pump will automatically re-prime continuously up to a suction lift of 25 ft. This feature makes the pump suitable for handling seepage in trenches and for similar applications.

Effective sealing has been given particular attention. A dual-face spring-loaded carbon seal unit is used in an oil chamber outside the pump body. By this method, abrasives in pumped liquids cannot reach the seal faces and cause early wear. Long seal life is, therefore, obtained, it is stated, together with high pumping efficiency.

The engine fitted as standard is the Villiers air-cooled Mk. 25HS petrol unit. The pumping set is mounted on a specially designed carrier (which is illustrated) or on a two-wheel trolley for easy handling. Both the carrier and the trolley are designed in such a way that they can be easily dismantled. The maximum capacity is 10,500 imp. gal. per hr. and the maximum total head is 80 ft.

The manufacturer is Goodenough Pumps. Limited, Byfleet, Surrey, from whom full details may be obtained.

Automatic Screwing Machine

APPLICATIONS of a 4-in. automatic screwing machine now developed include screwing of all sections of bolt and rodding, and in particular, coupling screws, drawhooks and buffers. The machine is arranged for driving from a constant-speed electric motor. It is fitted with the manufacturer's patent Tangential diehead; this can be replaced by a tapping chuck, so converting the machine to a single-speed horizontal tapping machine.

The capacity of the diehead is ½ in. to 3 in., and ½ in. to 4 in. for bolts and pipes respectively. Besides the hand releasing motion worked by a lever on the side of the machine, the dies open automatically when any predetermined length has been screwed, and close automatically on the return of the carriage. The machine is fitted with a roughing and finishing device to enable threads over 1½ in. to be cut at two passes, although on sizes under 2 in. dia. this is only necessary on tough alloy steels.

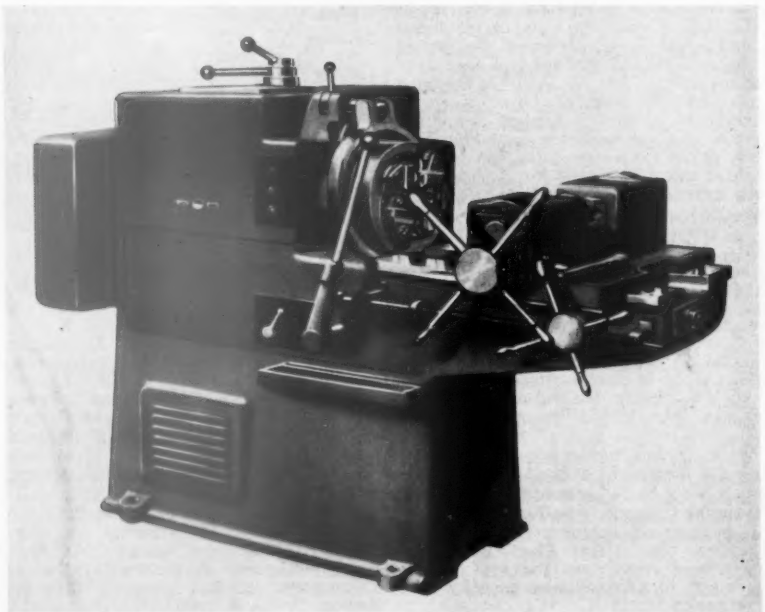
The box pattern vice is of the open-jaw, self-centring type; it is powerful and rigid. All operating mechanism is totally enclosed to prevent damage from swarf. An automatic pump for the cutting lubricant with the necessary piping, valves, and so on, also splash guards, is supplied.

The drive is taken from the 5-h.p. motor to the gearbox through vee ropes. The sliding gear-type headstock is splash lubricated. Final drive is by constant mesh helical gearing. All rotating shafts are mounted on ball races; the main spindle is mounted on pre-loaded angular contact and roller bearings. Nine spindle speeds are available.

When required, lead screw control to the carriage can be built into the machine complete with pitch indicator and the necessary change wheels. Alternate lengths of bed can be supplied to extend the travel of carriage up to 36 in.

The floor space of the two versions is 8 ft. 7 in. or 10 ft. 4 in. × 3 ft. 6 in. The net weight is 40 or 43 cwt. Standard electrical equipment is for use on 400-440 V. supply, three-phase, 50 cycles. One air break direct-on-line starter with under voltage and three overcurrent releases complete with an interlocking isolator switch and separate push button station incorporated in the headstock is also supplied as standard.

Further details may be obtained from the manufacturer, Joshua Heap & Co. Ltd., Ashton-under-Lyne, Lancs.



Land Clearance Tool

DESIGNED for clearing rough land of trees, boulders, scrub, and so on, as in new railway construction, the Drott grubber blade can be attached to the BTD-6 crawler tractor.

This attachment uses the arms and controls and has the same four-point fitting as another tool designed for use with the tractor. It consists of five curved teeth 34 in. long mounted on a heavy frame 67½ in. wide. These teeth are of manganese molybdenum steel, each of them designed to withstand more than the tractor full drawbar power. The teeth are individually mounted and adjustable for spacing; they have a penetration of 16 in.

With a patented pry-out action applied through the blade, the removal of stumps, and indeed of whole trees, it is stated, can be effected with ease and rapidity. This pry-out action exceeds the drawbar pull of the machine and, with hydraulic down-pressure to ensure full tooth penetration, permits the removal of boulders and stones that would require a machine of double the weight and power to remove by conventional means.

The blade can be tilted hydraulically back and forward. Pitched fully forward the teeth can perform a raking action; pitched backwards, the blade can be employed to carry objects, after removal, for piling or loading.

Another feature which is claimed to distinguish this equipment from other makes of similar purpose is the high reach which can be used to exert additional leverage when pushing over large trees.

The Drott grubber blade is manufactured in this country by the International Harvester Company of Great Britain Limited, Harvester House, 259, City Road, London, E.C.1.

Glass Fibre Signs

SIGNS made of polyester resin bonded glass fibre are being produced under the trade name Axonite; advantages claimed for this process over other materials used for sign work include toughness, resiliency, and a high degree of colour fastness. Axonite products include a prototype point signal disc of British Railways pattern.

These products are built up of successive layers of glass fibres, impregnated with a polyester resin to form an integral unit. Letters or emblems, which form the sign face are "built-in" to the surface to become part of the sign itself.

The effect of weather on the signs is stated to be very much less compared with other materials and colour fade is small; maintenance, therefore, is negligible. The resiliency of the material ensures the minimum damage from impact and it is resistant to most acids, petrols and oils.

These signs can be fixed by any method, such as nailing, drilling, and tapping, as the material is of a non-spreading nature. Metal components such as brackets and stakes can be permanently embodied in the sign during the course of manufacture without defacing the surface of the sign. They can be produced single- or double-sided with equal facility.

Further details of Axonite signs may be obtained from the manufacturer, G. Beaton & Son Ltd., Victoria Road, Willesden, London, N.W.10.

Diesel-Powered Small Jib Crane

THE Saga junior powered jib crane has been modified by the fitting of a diesel engine to replace the petrol unit previously fitted. This crane, which is suitable for work on temporary construction sites, and so on, is stated to have an improved performance with a reduction of fuel costs.

The crane will raise a 5-cwt. load at the rate of 110 ft. per min., and a 3-cwt. load at 220 ft. per min. At this duty the machine will operate for 7 hr. on ¼ gal. of fuel. The working radius is 4 ft. 4 in. for 5-cwt. loads or 5 ft. for 3-cwt. loads, and the jib is slewed by hand 360 deg. around a scaffold standard as illustrated below.

The engine used is a 3½-h.p. Lister L.D.1, fitted with an automatic governor, besides a hand throttle. The winch specification includes an improved two-speed drive, totally enclosed bearings, and ball journals requiring no site lubrication. Twin internal and independent shoe brakes are fitted, and a single lever control with a dead-man return to brake is fitted as standard. The jib is of patented design.

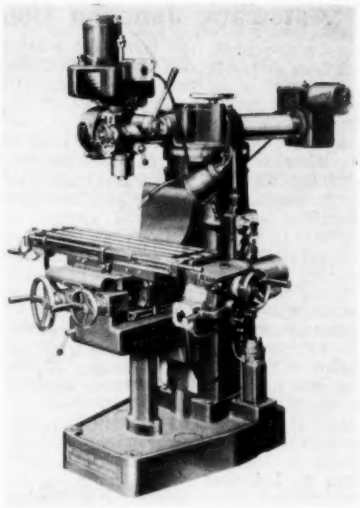
The price of the machine, complete with jib, is £167 10s. ex works, and the delivery period is two weeks. The manufacturer can also supply a complete set of parts for converting a petrol unit to the diesel model at a cost of £90 10s. The manufacturer is British Hoist & Crane Co. Ltd., Compton, Berks.

Turret Milling Machine

THE WM 369 turret milling machine is designed for milling, boring and jig boring at any angle, keyway and end milling, dies sinking, and mould pattern making operations.

The column is an internally braced strong box section casting with wide dovetail vee on the front to give bearing for the knee. The base is also internally braced, and incorporates a coolant tank. The knee has adjustable taper wear strips. Taper roller bearings are fitted to the cross slide and elevating screw. 3¼ in. dia. graduated dials are fitted. Controls and clamps are positioned in the front of the machine and are easily accessible.

The cross slide and table are rigid castings. Lubrication to the table bearing surfaces is by means of felt pads located in cast oil pockets in the cross slide which are charged through nipples by the grease gun provided. The 15-in. dia. turret is spigot located in the column, and graduated to rotate through 360 deg. After setting it is clamped rigid by four tee bolts. Provision is made for a slotting attachment to be mounted at the opposite end of the arm from the milling head. This features a body casting of high quality cast iron, the spindle and quill being of alloy steel, flame hardened and ground; the quill housing is honed for accurate alignment. Rapid hand feed to the spindle is obtained through pinion and rack. Operation of a clutch engages a fine feed and disengages the rapid feed.



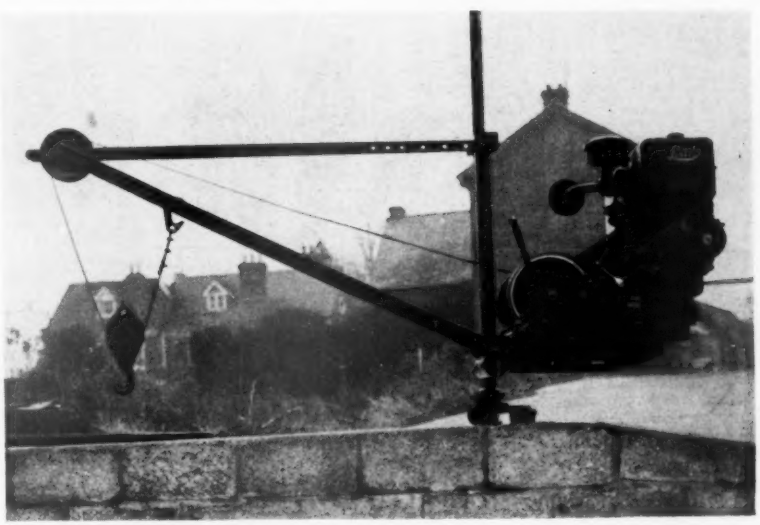
This feed can be advanced or retarded through a graduated dial. A micrometer depth stop bar is fitted, and the spindle quill can be clamped by pad bolt in any desired position.

The spindle nose is bored No. 3 Morse taper, and a drawbar is provided. A brake is fitted to facilitate quick cutter changing. The complete unit can be rotated through 360 deg. in the vertical plane about the turret overarm, and can be locked in any desired position.

Some leading particulars of the milling machine are as follow: table size 36 in. by 9 in.; longitudinal traverse under power, 20 in.; cross traverse, 9 in.; vertical traverse, 17 in.; max. dia. of turret swing, 74 in. The milling head, which incorporates a 1-h.p. motor, has six spindle speeds ranging from 400-4,000 r.p.m.; the max. distances of the spindle to table and to column are 14½ and 22½ in. respectively. The approximate net weight of the machine is 16 cwt.

Attachments include a ½-h.p. slotting head, and a table power feed in a longitudinal direction only, providing 12 feeds.

Further details of the WM 369 turret milling machine can be obtained from the manufacturer, Woodhouse & Mitchell, Wakefield Road, Brighouse, Yorks.



Automatic Junction Control at Kennington, L.T.E.

Automatic control of junctions by punched travelling record of working timetable

A description was given in our issue of December 13, 1957, of the essential principles of the "programme machine" being introduced by London Transport Executive for the automatic control of junctions by means of a punched travelling record of the working timetable, with facilities for an overriding control to deal with any emergency and ensure satisfactory continuity of traffic operation under all circumstances. There it was stated that this equipment would be brought into service at Kennington on January 12, but it is now announced that this is expected to take place on January 26.

We were permitted recently to visit interlocking and programme machine rooms at Kennington, and the control room at Leicester Square, both on the Northern Line, where synchronised machines are placed and where similar apparatus, working with that to be provided during the year at Euston and Camden Town, will eventually be installed. There will then be no signalmen at those places or, of course, at Kennington; the entire central area of the line will be supervised from Leicester Square.

Functioning of Train Describers

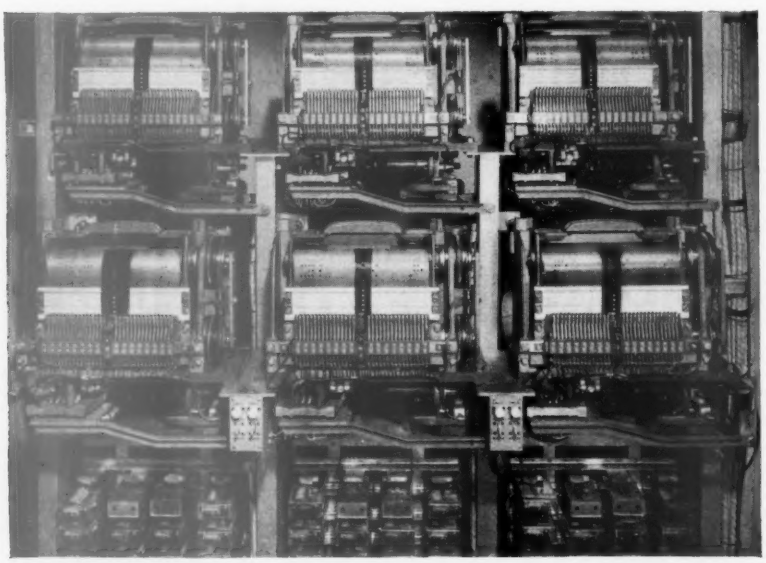
The train describer system, operating from the signalboxes outside that area, will remain in service and function in conjunction with the programme machines, as explained in our article referred to above. In the event of a discrepancy arising between describer and programme machine the fact is notified to Leicester Square at the appropriate moment and the supervisor can take such action as he judges fit.

Time Machines

Lateness of any train approaching a junction also is notified him, for which purpose the programme machines are supported by time machines, as seen on the left of the accompanying illustration. Facilities are provided for cancelling a train, if, say, it has to be taken out of service for some defect, and for re-establishing the correct traffic sequence thereafter. In case of necessity the supervisor can take complete control of a junction and operate it from a group of route-setting buttons.

At Kennington there are, besides the ordinary junctions, a run round loop for the Charing Cross line and sidings serving that and the City line. At Euston there are sidings only and no junction, but trains reverse there at certain times and these movements will be controlled automatically. At Camden Town there are no sidings but there is a crossover at Mornington Crescent, the next station southward on the Charing Cross line.

It is expected that when the entire installation is in service the traffic will be dealt with more expeditiously than hitherto, with an appreciable saving in operating costs.



In Kennington apparatus room: on the left are two time machines, with four programme machines alongside; below are various control relays

British Railways Camping Coaches

British Railways will have over 200 holiday camping coaches, with 125 sites to choose from, in use during the coming holiday season, and bookings for these coaches can now be accepted. The coaches will be available from the end of March to the end of October. The sites are in widely varied inland and coastal holiday areas, including the Ayrshire and Fife coasts; the Cambrian coast; East Anglia; the Lake District; North Wales; the Peak District; the Scottish Highlands; the South coast; the West Country; the Wye Valley, and the Yorkshire coast.

Coaches with sleeping accommodation for four, six or eight people can be hired, each with a living room and a well-equipped kitchen. Cooking utensils, crockery, cutlery, towels, table and bed linen are provided. Bookings, which may be for either one or two weeks, are at weekly rentals ranging from £5 10s. to £12 10s. according to site and season; tenants must buy a specified minimum number of rail tickets from their home stations to the station nearest to the camping coach site.

Adapted Buildings

Other holiday accommodation, similarly contingent on the purchase of railway tickets, will be available in specially selected and converted station buildings at 21 places mostly on closed branch lines, in the Scottish and North Eastern Regions. Rentals for four, five or six people range from £4 10s. to £11 a week according to season.

Folders giving full details of camping coaches are obtainable from British Railways stations and enquiry offices.

Visit to Broom & Wade Limited Works

Products of the works at High Wycombe, Bucks, of Broom & Wade Limited, which were visited by the technical Press last Monday, include, with special reference to railways, portable and stationary compressed air plants, pneumatic workshop hand tools, and locomotive-carried compressor units.

The party was welcomed by the joint founder of the company, Mr. H. S. Broom, Chairman, and by Mr. H. Dick Broom, Joint Managing Director.

The company, founded in 1898, now employs some 1,400 staff; it commenced production of air compressing equipment around 1914, after being engaged previously in general engineering. Production has increased by some 200 per cent since 1949; current export trade figures are slightly less than 50 per cent of the total turnover.

During the visit to the works, examples were seen of the current range of equipment produced by the company, including single- and double-acting air compressors for works installations, pneumatic tools and equipment for mechanical, foundry and civil engineering applications, and portable air compressors.

Rotary Compressor

A comparatively recent development of the last mentioned is the rotary-type compressor. This has been developed to obtain the advantages of reduced weight and increased efficiency compared with the conventional design. A weight saving is achieved of two-thirds that of a reciprocating unit with the rotary design. Wear on the compressor blades is reduced by a system of "oil-flooding," in which oil is pumped into the air as it is compressed. After compression it is separated by swirl and a filter in the air receiver. The oil is then recirculated by pumps through a cooler. The company is believed to be the only firm in Europe to have designed this type of compressor with success.

A demonstration was also arranged to show examples of the range of light pneumatic equipment such as screwdrivers, nut runners, and hoists, which the company intend to produce under licence from the Aro Equipment Company, of Ohio, U.S.A.

This range of tools and machines is generally compact compared with the duties for which the equipment is designed.

New Freight Depot at Lincoln, Eastern Region

Re-designed yard, new shed, and mechanical equipment for expediting traffic

Work started recently at Holmes Yard Goods Depot, Lincoln, Eastern Region, in preparation for the erection of a new goods shed. The new building will be on the same site as the old shed, now demolished.

New foundations have had to be sunk. Piling of the site has been necessary, with in situ reinforced concrete piles. The shed will be 368 ft. long and the skeleton of the walls and roof will be formed by 12 welded steel portal frames with a span of 140 ft. The skeleton will be filled in by a brick wall 6 ft. high, extending along the whole of the south and for half the length of the north side. The remaining portion of the north side will be screened by the existing office block.

Both ends of the shed will be left open. The sides of the shed from the top of the brickwork upwards will be of corrugated asbestos sheeting and patent glazing. The roof will be of the same materials.

Within the shed, but structurally distinct, there will be a traffic bench of reinforced concrete slab supported by brick walls and finished with asphalt. It will be flanked at its western end by two sidings each with accommodation for seven wagons. Most of the remainder of its 360-ft. length will be taken up by the provision of 38 cartage berths disposed along two sides. At the eastern end of the shed, though separate from it, there will be a staff amenities block connected to the existing office block.

The yard itself will be completely re-designed and a total of 1,540 yd. of new plain track and 830 yd. of switch and crossing work installed. The surface of the yard will be of rolled asphalt and lighting will be provided by clusters of lights mounted on lighting towers.

Accommodation for the operating staff employed in and about Holmes Yard will be transferred to a new site south of the Lincoln—Pyewipe Junction line. The buildings will be of the same style as the amenities block in the freight depot.

Traffic Handling

The shed and bench are designed to deal with a combined inwards and outwards sundries traffic of about 260 tons daily. Full-load traffic will continue to be dealt with in the appropriate portions of the goods yard.

Inwards traffic will arrive at the west end of the bench on either of the two tracks mentioned above. It will be discharged from the wagons to a 31-ft. wide slat conveyor running for 320 ft. of the 360-ft. bank. The conveyor will run at the rate of 40 ft. a min. and the packages will be taken off as they pass the cartage vehicle appropriate to the address for delivery. The slat conveyor is being supplied by the Paterson Hughes Engineering Co. Ltd.

Tranship traffic will be similarly dealt with but will be transferred to a trailer for conveyance to the appropriate outward wagon. Three Scott electric internal movement vehicles will be the prime movers for the trailer loads of transhipments.

All outward sundries will be loaded direct into wagons in three sidings, each standing 17 wagons, which have been reserved for this traffic. The entire operation will be under cover.

The general layout of the new depot was prepared by the staff of Mr. A. K. Terris, Chief Civil Engineer, Eastern Region and the design of the shed and the supervision of this part of the work is being carried out by C. H. Dobbie & Partners on his behalf. The staff amenities block and other accommodation was designed by Mr. H. H. Powell, Architect, Eastern Region.

The contractors for the scheme are William Moss & Sons Limited, of Loughborough and the whole of the work is being carried out under the overall direction of Mr. Terris.

Cutting-Slope Stabilisation

The Victorian Railways now use equipment to stabilise steep slopes of cuttings. It consists of three units, a Klodbuster, Mulch-spreader and Hydro-seeder. The slope is first prepared by the Klodbuster, consisting of a spiked chain with a heavy wheel at one end; the other end is attached to a tractor. The chain is paid out down the slope with the wheel at the foot, and the tractor then moves along the top of the slope, the chain moving with it along the slope, scarrifying it into small horizontal furrows for the reception of a mulch.

The mulch-spreader, mounted on a trailer behind a lorry, is fed with hay or straw—previously carried in bales on the lorry—and teases it and blows it out through a large nozzle after it has been impregnated with bitumen emulsion. The rate of deposit through the nozzle or gun is controlled, and the mulch is thus deposited evenly on the slope. As a result of this treatment the hay- or straw-fibres adhere to the slope and to each other, forming a blanket that holds water, seed and fertilizer, and also providing mechanical support for the surface of the slope.

Fertilizer and grass seed are mixed in a water tank on another lorry and pumped through the hydroseeder nozzle at a uniform speed, to be projected through the mulch on to the slope-soil under excellent conditions for germination and growth.

Staff and Labour Matters

Railwaymen's Wage Claim

A meeting of the Railway Staff National Council took place on January 14, when the three railway trade unions, the N.U.R., A.S.L.E.F., and T.S.S.A., submitted their claims for improved rates of pay for railway salaried and conciliation staff. The B.T.C. representatives undertook to give a considered reply at a meeting to be held on January 24.

London Busmen's Pay Claim

A deadlock had been reached as we went to press in the negotiations between the London Transport Executive and the Transport & General Workers' Union on the claim for improved rates of pay for London busmen.

In discussions on January 8, no progress was made and it was decided to refer the dispute to Sir Wilfred Neaden, Chief Industrial Commissioner at the Ministry of Labour. A meeting took place with Sir Wilfred Neaden on January 10, but no agreement was reached.

The London Transport representatives are reported to have stated that they could not make any offer at present in reply to the union's claim for an all-round increase of 25s. a week, and suggested that the claim should be deferred. The union representatives were unable to accept this proposal.

Temporary Flyover at Lewisham, Southern Region

(*See editorial comment on page* 62.)

The first (ballast) train passing over the temporary flyover near St. Johns, Lewisham, on January 9. The original bridge was wrecked in the accident on December 4, 1957; work began immediately on the temporary bridge

Contracts and Tenders

Rolling stock for the London Transport Executive

The London Transport Executive has placed an order with the Metropolitan-Cammell Carriage & Wagon Co. Ltd., for 13 "R" stock cars to the value of £250,000, for use on the District Line of London Transport.

The British Transport Commission has announced that contracts have been placed with British Insulated Callender's Cables Limited and British Insulated Callender's Construction Co. Ltd., for the supply and installation of overhead conductor equipment for the electrification of 415 track miles in the Eastern and London Midland Regions of British Railways. Equipment will be installed between Fenchurch Street, Tilbury, Southend, and Shoeburyness—170 track miles; between Liverpool Street, Enfield, Chingford, Hertford, and Bishops Stortford—105 track miles; and between Liverpool and Crewe—140 track miles.

South African Railways have placed a contract with John Laing & Sons (S.A.) Pty. Ltd., to the value of £230,000 for earthworks and general construction in connection with the conversion of the narrow gauge railway line between Usakos and Tsumeb in South West Africa, to standard gauge.

British Railways, London Midland Region, have placed an order with Whartons Engineers Limited, of Elstree, for an auger borer. The machine will be used for mast erection work in connection with the London Midland Region main-line electrification programme.

British Railways, North Eastern Region, have placed the following contracts:—

British Insulated Callender's Construction Co. Ltd., Kirkby: overhead current collector equipment, Dinsdale Rail Welding Depot

Brush Electrical Co. Ltd., Loughborough: two 500 KVA. transformers, York North Motive Power Depot.

H. Berry & Co. Ltd., Leeds: one spring scragging and testing machine, York Wagon Works

Brown & Wade Limited, High Wycombe: air compressor and accessories, Simonside Wagon Repair Depot.

The Special Register Information Service, Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From South Africa:

275,000 concrete sleepers in accordance with specification C.C.E. 1/28-1957 (amended August, 1957) and the relevant drawings

275,000 fastenings for sleepers in accordance with specification C.C.E. 1/28-1957 (amended August, 1957) and the relevant drawings.

The issuing authority is the Stores Department, South African Railways. Bids in sealed envelopes, endorsed "Tender No. 6825: Concrete Sleepers, etc.," should be addressed to The Chairman of the Tender Board, P.O. Box 7784, Johannesburg, South Africa. The closing date is January 31, 1958. The Board of Trade reference is ESB/31701/57.

123 items of carriage fittings, including bolts, brackets, indicator springs, sliding door catch hooks, chains, clips, handles, indicator bolts, hinges, locks, toilet paper holders, coat hooks, wash basins, bunks, door controllers, slide and exterior guide plates, rubber stops, drop table supports, coffee and folding table stays, water taps and vessels, ash trays, bed sling sockets, knobs, brass angles, sockets for barrel bolts, brass tubing, blinds, and cages

The issuing authority is the Stores Department, South African Railways. Bids in sealed envelopes, endorsed "Tender No. H.6642: Carriage Fittings" should be addressed to the Chairman of the Tender Board, P.O. Box 7784, Johannesburg, South Africa. The closing date is February 7, 1958. The Board of Trade reference is ESB/31702/57.

From Iraq:

15 metre gauge diesel-electric locomotives.

Tender documents may be obtained by bona fide tenderers or their representatives from the Directorate General of Railways, Baghdad West, on payment of a fee for documents of IDs. 25 per set. This fee is not returnable. Tenders must be accompanied by a deposit or guarantee of IDs. 20,000. The tender no. is IRS/R/42/56. Tenders must be submitted to the Director General, Iraqi State Railways, Baghdad, on or before noon, April 26, 1958. Although local representation is not essential the Commercial Secretariat of the British Embassy in Baghdad suggests that if United Kingdom firms are in doubt about, or unfamiliar with local conditions they should arrange with a local agent to look after their interests. The names of Iraqi firms who have expressed willingness to act in this capacity can be obtained from the Board of Trade. No further information about this call for tenders is available at the Board of Trade.

7 metre gauge bogie flat wagons and spares

3 standard gauge bogie flat wagons and spares.

Tender documents may be obtained by bona fide tenderers or their representatives from the Directorate of Railways, Baghdad West, on payment of a fee for documents of IDs. 25 per set. This fee is not returnable. Tenders must be accompanied by a deposit or guarantee of IDs. 1,800. The tender no. is IRS/C/39/56. Tenders must be submitted to the Director General, Iraqi State Railways, Baghdad, on or before March 29, 1958. No further information about this call for tenders is available at the Board of Trade.

From India:

46 electric motors, three-phase, 50-cycle, induction, synchronous, commutator, squirrel cage and accessories, such as capacitors, drum starters, reduction gears, water heater with automatic heat regulation for laboratory use, and self-regulated heating device for material test purpose

3 diesel locomotives, 75 h.p. metre-gauge, with spares.

The issuing authority is the Bagalkot Cement Co. Ltd., Stadium House, Veernariman Road, Bombay 1, India. The tender No. is 86-99-J4-7202. The closing date is January 20, 1958. No further information is available at the Board of Trade regarding this call for tender, and interested suppliers should communicate direct with the buyer.

From Sudan:

The Controller of Stores, Sudan Railways, Atbara, invites tenders for the supply of rails and other items of permanent way materials, details of which can be obtained from the Office of Controller of Stores on application. The closing date is February 10, 1958. No further information about this call for tenders is available at the Board of Trade.

200,000 hardwood sleepers 5 in. thick by 9 in. wide by 6 ft. 6 in. long.

The issuing authority is the Controller of Stores, Sudan Railways, Atbara. The closing date is February 3, 1958. The tender No. is 1717. Bids must be submitted in sealed envelopes marked "Tender for Sleepers." No further information is available at the Board of Trade regarding this call for tender.

Further details regarding the above tenders, together with photo-copies of tender documents, can be obtained from the Branch (Lacon House, Theobalds Road, W.C.1).

The Special Register Information Service, Export Services Branch, Board of Trade, reports that the closing date of the call for tenders from India for seven broad gauge electric locomotives, reported on page 376 of our September 27, 1957, issue, has been postponed to January 31, 1958.

CABLE CARS WRECKED BY ALPINE BLIZZARDS.—Extensive damage is reported to have been done by blizzards to cable railway equipment on the Italian side of Mont Blanc. Cables weighing many tons were torn from the supporting pylons and hurled on to a glacier. Cars suspended from the cables were blown into snowdrifts some distance away.

PERMALI LIMITED FACTORY AT GLOUCESTER.—Partial occupation of the recently constructed Permali Limited factory at Gloucester of some 180,000 sq. ft. area has now released more space in the existing works to expand manufacture of P.T.F.E. (polytetrafluoroethylene) products. This plastic material is sold under the name of Permaflon and, among its many properties, it completely resists most chemicals between a working temperature range of −80° C. and 250° C., and is available in sheet, block, cylinder, rod and other forms, including dispersion coatings.

BRITISH JIGMIL MANUFACTURE.—The first four DeVlieg Jigmils to be manufactured in this country have been completed at the Lutterworth Works of Alfred Herbert Limited. It is the smallest of the range known as the Herbert-DeVlieg No. 2B/36 Spiramatic Jigmil, and is being manufactured under licence from the DeVlieg Machine Company of Detroit, U.S.A. Apart from minor exceptions, it is an exact copy of the American-made machine to ensure interchangeability between components for both manufactures. The Jigmil has a general assembly accuracy of ·0001 in. per ft., and is particularly applicable to toolrooms and diesel locomotive ancillary equipment such as the boring of transmission casings. It has a vertical capacity of 24 in., a horizontal capacity of 36 in., and is fitted with a 2½ in. dia. spindle.

Notes and News

C.P.R. Order for New Liner.—The order for the new liner for the Canadian Pacific Railway Company was placed with Vickers-Armstrongs Limited by that company and not as stated through a printer's error on page 57 of our January 10 issue.

Metropolitan Railway Country Estates Limited.—The dividend of Metropolitan Railway Country Estates Limited is 15 per cent for the third successive year. Group profit for the year ended October 31, 1957, was £32,608, against £33,036 for 1955-56, after deducting tax of £42,766 (£31,724), and after crediting £5,300 (£13,913) arising from Town & Country Planning Act claims.

Combined Air and Rail Tickets to Isle of Man.—Combined rail and air tickets to the Isle of Man via British Railways and British European Airways are now obtainable at many stations in the Midlands and North West. Passengers travel by rail to Liverpool or Manchester and connect by air terminal coaches to the airports for the flights to the Isle of Man.

Road Casualties in November, 1957.—Road casualty figures for November, 1957, show that 541 persons were killed and 5,637 seriously injured; 17,337 were slightly injured. The total of 23,515 casualties is 2,000 more than in November, 1956, an increase of just over 9 per cent. There were increases of 35 in the number of those killed, 532 in the seriously injured, and 1,433 in the slightly injured. These increases, the Ministry of Transport & Civil Aviation states, may be partly accounted for by the fact that traffic in November, 1956, was probably below normal, because of increased petrol prices and the need for saving fuel.

Miniature Buffets in British Railways Passenger Coaches.—A new type of light refreshment service—a miniature buffet built into an ordinary second class passenger coach—has been developed by British Transport Catering Services. The buffets have been designed for use in certain services where a special catering vehicle cannot be provided, and also to augment or replace existing restaurant car facilities, as necessary. The first of 12 vehicles so equipped was introduced in the "Flying Scotsman" between Kings Cross and Edinburgh last Monday, to augment the regular restaurant car services in this train. As further second class coaches are converted to include the buffets they will be introduced on other Eastern Region services between Liverpool Street and Cambridge, March, St. Ives (Hunts.), and Norwich.

Whitstable Harbour Sold by B.T.C.—Whitstable Harbour has been bought by the Whitstable Urban District Council from the British Transport Commission. The harbour was opened in 1832, the first in the world with a railway connection (the Canterbury & Whitstable Railway). The railway was closed first for passenger, and some years later, in 1953, for goods traffic, and the track taken up.

Colwich Station to Close.—Colwich Station, between Lichfield and Stafford, London Midland Region, is to be closed from February 3. Buses are operated in the area by the Birmingham & Midland Omnibus Co. Ltd., to and from Stafford and Rugeley. Parcels and passenger train merchandise and livestock will be dealt with at Rugeley, and alternative arrangements are being made for merchandise, minerals, and coal class traffic.

New Self-Drive Car Hire Facility.—Victor Britain Limited, of 12a, Berkeley Street, London, W.1, has introduced a new facility, the "Gold Card." This is stated to be unique in this country, though it follows a pattern successfully employed by car hire firms in the U.S.A. for several years past. The basic feature is a "gold card" issued on application to company directors and executives, professional men, and officials travelling on their firm's behalf. This card is a strictly personal possession. It entitles the holder to call for a self-drive car at any time, through a network of Victor Britain offices and agents throughout the country. When the car is delivered and the gold card and its holder's driving licence have been shown as identification, there is no more formality. The hirer drives away for a few hours or possibly for weeks. The account is rendered to the hirer's office and one periodical bill covers all the services rendered. If there are several members of a firm with gold cards the same account will cover all their hirings.

David Brown Corporation Limited.—The group net profits of the David Brown Corporation, Limited, were increased to £177,750 in the year ended June 30, 1957. There is again no ordinary dividend, and the carry forward is £1,234,890 (£1,224,887). After crediting £57,625 (£175,000) tax recoverable, taxation amounts to £262,902 (£9,035). Allowing for outside interest the present net profit is £178,923, against a loss of £1,615. Dividend on the 5½ per cent preference stock of the parent company is £47,438 (same).

Railway Outlet for Saharan Oilfield.—The first Sahara oil, flowing through a 112-mile pipeline, last week began to pour into one of the storage tanks at the railhead of Touggourt, whence the oil is conveyed by tank wagon to the port of Philippeville. From there tankers will take it to Marseilles. The narrow-gauge line from Touggourt has been converted to standard gauge. A few days after transport of oil had begun, a mine was placed on the track near Philippeville, and exploded, wrecking a southbound freight train. The damage was soon repaired.

British Transport Advertising Complementary to Television.—"You need British Transport Advertising to balance I.T.V." is the title of an article in the current issue of *Transad News*, the official publication of the British Transport Commission commercial advertising service. Facts and figures are given to show how transport advertising and the Independent Television Authority, working together, can provide 99 per cent coverage over the whole country. The article explains the part Transport Advertising sites play in areas still outside I.T.V. reception. It is pointed out that "the more advertisers use the newest medium [television] the more they will need British Transport sites to support, in longer terms, the briefer appearances on the screen." Transport advertising, it is stated, provides the link between I.T.V. and point of sale. Furthermore, viewers normally see I.T.V. after the shops are shut, so that active response

Miniature bar, 12 ft. 6 in. long, in second class coach of Eastern Region express

View through to bar from open portion of coach, showing arrangement of partition

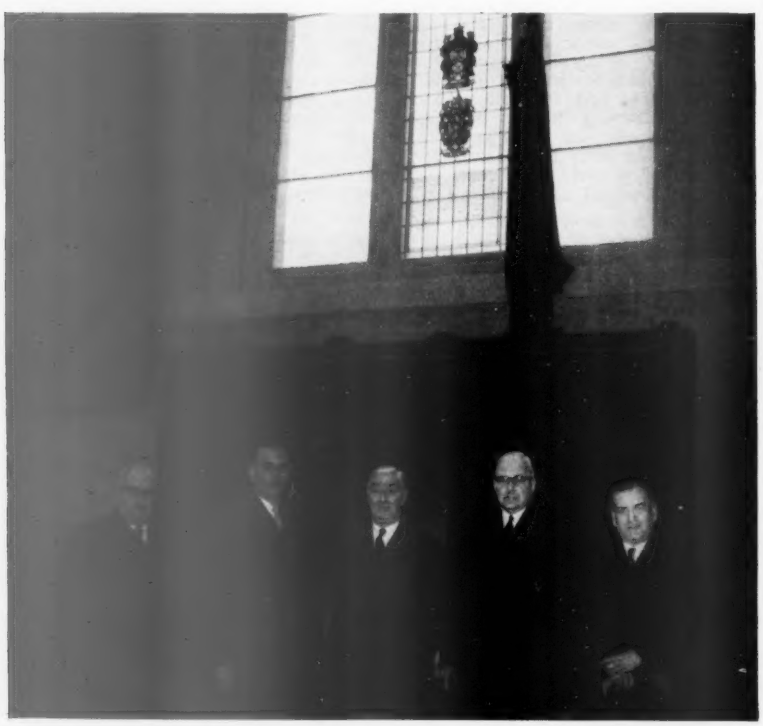
to television advertising must wait until next day and depend on memory unless the advertiser provides a further stimulus through the medium of British Transport sites. A feature of the article is a map of Great Britain showing the "spheres of influence" of I.T.V. and British Transport advertising.

New Manchester Premises for Bridges Tools.—S. N. Bridges & Co. Ltd. recently acquired new premises at 15, Quay Street, Manchester, 3; sales and service facilities are available. Their telephone numbers are: service, Deansgate 4928; and Sales Department, Deansgate 4929.

Brush Continues Delivery of Type "2" Diesels to Eastern Region.—The fourth of the 20 1,250-h.p. diesel-electric type "2" locomotives, under construction by Brush Traction Limited, was delivered to the Eastern Region last week. It is intended to deliver the remaining units of the batch at the rate of one every three weeks. The accompanying illustration shows some of the locomotives under construction at the builder's Loughborough works. The design was described in our issue of November 1.

Some of the Brush-built 1,250-h.p. diesel-electric locomotives for Eastern Region, under construction at Loughborough

Unveiling of Memorial Window at Gresham & Craven Limited New Factory.—The illustration below shows a group after the ceremony on December 18 when Mr. M. W. Shorter, Managing Director of the Westinghouse Brake & Signal Co. Ltd., deputising for Captain A. R. Nutting, Chairman of that company, who was indisposed, unveiled a stained glass memorial window at the new factory of Gresham & Craven Limited at Worsley. This window is one taken from the Ashton-on-Mersey house of the late James Gresham, J.P., founder of the firm. In the group are (left to right): Lt.-Colonel Harry Gresham, Director, Gresham & Craven Limited; Mr. J. W. G. Kershaw, Director, Gresham & Craven Limited and Westinghouse Brake & Signal Co. Ltd.; Mr. J. Neville Gresham, Chairman & Managing Director, Gresham & Craven Limited; Mr. M. W. Shorter; and Mr. J. G. Hall, Director & Financial Controller, Westinghouse Brake & Signal Co. Ltd.



After the unveiling of the memorial window at the Gresham & Craven Limited new factory at Worsley

Government Views and Intentions as to Road Haulage.—The Minister of Transport & Civil Aviation, Mr. Harold Watkinson, in a New Year message to the Road Haulage Association, has stated that the Government firmly believes that the present solution is the right one for the whole of the road haulage industry, that "the mixed economy of State and private enterprise, with free competition between them," is in the public interest. It will, therefore, oppose plans which would seek to throw this industry back into partisan political controversy, which can only do harm to the road haulage industry, "which needs to be left alone to solve its problems and to increase its efficiency."

Film Illustrating Use of Tubular Structures.—Tubewrights Limited, a subsidiary of Stewarts & Lloyds Limited, presented the film "Tubular Engineering" at the British Council Theatre, Hanover Street, London, W.1, on January 9. It is a sequel to the film "The Tubewright" and shows the second stage in the development of the use of the hollow section for structural purposes. The applications illustrated include tall lightweight structures for the floodlighting of marshalling yards and sidings, transmission towers, and conveyor bridges for collieries, power stations, and other large works. The film is produced in black and white, and has a running time of 26 min. The commentary is spoken by Frank Phillips. Loan of the film is free on application to any branch of Stewarts & Lloyds Limited.

Breach in Sea Wall on Barrow-Carlisle Line.—Some 30 permanent way staff of the London Midland Region of British Railways, working in shifts for five days, have succeeded in repairing a 50 ft. breach in the sea wall between Parton and Harrington on the West Cumberland coast. The damage was caused by severe gales on the night of January 8, and was discovered by the early morning patrol which walks the section daily before the movement of traffic. High spring tides hampered repair work, and the gales extended the period of high water. Working during low tide,

repair gangs piled 2-cwt. concrete blocks into the breach to prevent extension, followed by 4-ton blocks. When the damage was discovered traffic was cancelled, and a bus service put into operation between Workington and Whitehaven. Freight trains were diverted via Cleator and Workington.

Flood Damage in Ceylon.—The Minister of Transport & Works estimates that it will cost about Rs.150,000,000 to repair damage caused in Ceylon by the recent floods to the road system and the railway, inclusive of Rs.50,000,000 for rolling stock destroyed.

Edgar Allen & Co. Ltd. Interim Dividend.—An interim ordinary dividend of 5 per cent has been announced by Edgar Allen & Co. Ltd. For the year ended March 30 a single dividend of 12½ per cent was paid. The directors believe at present that the results for the full year should prove satisfactory and that a final dividend of 7½ per cent is expected to be recommended. Group turnover and profits before tax, for the half-year to September 30 compared favourably with those of the same period of 1956.

Birfield Industries Limited New Division.—Birfield Industries Limited, the sales organisation of the Birfield group, has announced formation of a new division, to be known as the engineering division. This will co-ordinate the selling activities of the Birfield group in conjunction with the existing automotive, railway, and aviation divisions of Birfield Industries Limited, at the same time bringing to customers in the general engineering field the combined resources of the whole Birfield group of manufacturing companies.

Prototype Two-tier Motorcar Wagon.—The Matcar prototype two-tier motorcar wagon shown in the accompanying illustration is owned by M.A.T. Transport Limited, and was built by Newton Chambers Limited. It is capable of carrying six average size motorcars between Britain and the Continent, and is equipped with Westinghouse brakes to run on fast freight trains of up to 62 m.p.h. on the Continent. The overall length of the vehicle is 60 ft. 8½ in. It is at present operating over Eastern Region lines and on the Harwich - Zeebrugge ferry service.

Monorail Link with London Airport.—The practicability of a monorail link between the centre of London and London Airport is being investigated by the Ministry of Transport & Civil Aviation. Mr. G. R. H. Nugent, Parliamentary Secretary to the Ministry, flew to Cologne on Tuesday to inspect a demonstration length of monorail which is being operated experimentally in that city. He is studying the technical problems involved in the construction and running of such a system. The construction of a monorail is one of the suggested solutions to the problem of reducing the journey time between the centre of London and London Airport. It is emphasised by the Ministry, however, that before a system of this kind could be brought into public use in the U.K., long and rigorous tests would have to be conducted over a trial length in order to satisfy the safety requirements of the Ministry. Mr. Nugent was accompanied by officials of the Ministry, and a representative of the British Transport Commission.

Record Machine Tool Output.—A new record month's output has been achieved by the United Kingdom machine tool industry. Deliveries in October 1957, totalled £8,970,000, against the previous record of £8,880,000 attained last March. New orders received during October, although higher than in September, continued to run well below the level of a year ago. As a result, the industry's total of outstanding orders declined further to the lowest figure since early 1955. The increase in production last October brought output for the ten months to £79,600,000, within £4,000,000 of the total for the whole of 1956. Assuming this rate of production to have been maintained throughout the final quarter of last year, total output for 1957 is likely to have exceeded that for 1956 by some 15 per cent.

Safe Carriage of Fissile Material.—Mr. Sterling Cole, Director-General of the International Atomic Energy Agency, announced at a press conference in Vienna on January 14, that a scientific study group would shortly be formed to draw up an international code of safety regulations for the handling and transport of fissile material. Mr. Cole, who described the drawing up of a safety code as an essential basis for the future work of the agency, indicated that other organisations, including various railway and shipping companies, were already considering safety problems in this connection.

The Matcar two-tier motorcar wagon, showing dual position brake lever for freight or passenger train working

Forthcoming Meetings

January 17 (*Fri.*).—Railway Correspondence & Travel Society, London Branch, at the Railway Clearing House, Eversholt Street, London, N.W.1, at 7.15 p.m. Paper on "The Midland Railway's London extension," illustrated by lantern slides, by Mr. S. Summerson.

January 17 (*Fri.*).—Institute of Transport, Tees-side Section, at the Cleveland Scientific & Technical Institution, Middlesbrough, at 7 p.m. Paper on "American visit," by Mr. A. R. Dunbar.

January 21 (*Tue.*).—Railway Correspondence & Travel Society West Riding Branch, at the B.R. Social and Recreation Club, Aire Street, Leeds, 1, at 7.30 p.m. Paper on "Transport treasures," illustrated by lantern slides, by Mr. J. H. Scholes, Curator of Historical Relics, B.T.C.

January 21 (*Tue.*).—Railway Correspondence & Travel Society, West Midlands Branch, at 64, Holyhead Road, Coventry, at 7.30 p.m. Paper on "The Yorkshire Moors and in the Cleveland Hills," by Mr. H. D. Botwell.

January 21 (*Tue.*).—Institution of Mechanical Engineers, Graduates' Section, London, at 1, Birdcage Walk, Westminster, S.W.1, at 6.30 p.m. Paper on "The engineering and other aspects of the British Railways modernisation plan," by Mr. J. P. Marson (student).

January 21 (*Tue.*).—Institute of Transport, Humberside Section, at the Chamber of Commerce & Shipping, Hull, at 7.30 p.m. "American visit," by Mr. A. R. Dunbar.

January 22 (*Wed.*).—Institute of Transport, Beds, Cambs, Hunts Section, at Owen Webb House, Cambridge, at 6.45 p.m. Paper on "Outlook for oil," by Mr. A. Moon, Shell-Mex and B.P. Limited.

January 22 (*Wed.*).—Institution of Mechanical Engineers, Applied Mechanics Group, at 1, Birdcage Walk, Westminster, S.W.1, at 6.45 p.m. Discussion on "Measurement of noise and vibration."

January 22 (*Wed.*).—British Railways (Southern Region) Lecture & Debating Society, at the Chapter House, St. Thomas' Street, S.E.1, at 6 p.m. Paper on "Recent devolpments in permanent way," illustrated by lantern slides, by Mr. L. G. B. Rock.

January 22 (*Wed.*).—Railway Correspondence & Travel Society, West Mid-

lands Branch, at the Arden Hotel, Birmingham, at 7.30 p.m. Talk by Mr. H. F. Carrier, illustrated mainly with Midland Railway slides by the late Mr. F. Carrier.

January 23 (*Thu.*).—British Railways Western Region) London Lecture & Debating Society, in the Headquarters Staff Dining Club, Bishop's Bridge Road, Paddington, W.2, at 5,45 p.m. Paper on "The London Airport," illustrated by slides, by Mr. G. J. H. Jeffs, Commandant, London Airport.

January 23 (*Thu.*).—Institution of Locomotive Engineers, at the Institution of Mechanical Engineers, 1, Birdcage Walk, London, S.W.1, at 5.30 p.m. Paper on "A new method of assessing the riding of vehicles and some results obtained," by Mr. J. C. Loach.

January 23 (*Thu.*).—Permanent Way Institution, Manchester & Liverpool Section, in the Everton Room, Exchange Hotel, Liverpool, at 7 p.m. Joint meeting with the Liverpool Branch of the Signal & Telegraph Technical Society. Paper on "Permanent way work and the operating department," by Mr. Fairclough.

January 24 (*Tue.*).—Institute of Transport, Metropolitan Graduate & Student Society, at 88, Portland Place, London, W.1, at 5,45 for 6.15 p.m. Paper on "Operational research in London Transport," by Mr. R. A. Wright (Graduate).

January 25 (*Sat.*).—Permanent Way Institution, at the Institution of Civil Engineers, Great George Street, S.W.1, at 2.30 p.m. Annual winter meeting. Followed by a conversazione at the British Transport Commission Headquarters, 222, Marylebone Road, London, N.W.1, at 5.30 for 6 p.m.

January 27 (*Mon.*).—Institution of Railway Signal Engineers, Bristol Section, at the Staff Canteen, Temple Meads Station, at 6 p.m. Paper on "Developments in signalling equipment in relation to the 25 kV. electrification project," by Mr. W. M. Sweetenham.

January 28 (*Tue.*).—Railway Correspondence & Travel Society, East Midlands Branch, at the N.C.S. Guild Room, Toll Street, Nottingham, at 7.30 p.m. Paper on "North Staffordshire Railway reminiscences," illustrated by lantern slides, by Dr. J. R. Hollick.

January 30 (*Thu.*).—The Model Railway Club, at Caxton Hall, Westminster, S.W.1, at 7.45 p.m. Talk on "Out-of-way lines worth modelling" (Part 2), by Laurie Ward.

Railway Stock Market

Stock markets have shown no marked reaction to the important home political development and the latest news in international affairs. The main effect on markets has been to reduce the volume of business because buyers are naturally cautious and inclined to adopt a waiting policy. On the other hand, selling has been very moderate and much less than has been feared at one time in the City. A factor which helped sentiment considerably has been the renewed strength in sterling in the foreign exchange market. In fact it has risen to $2·81\frac{1}{8}$, the highest for three-and-a-half years. This strength has been interpreted as indicating that the latest political developments in Britain are being viewed calmly abroad.

British Funds again strengthened, helped by the trend in the £, though on the other hand there is now a widespread belief that a reduction in the Bank rate in the near future is improbable, because it might affect confidence in sterling. A lower Bank rate could suggest that we were less determined to deal with the inflation danger. There has been little buying of industrial shares, partly because sentiment is still affected a good deal by the fear that the business recession in the U.S.A. may continue for some while, in which case it could lead to a sharp decline in world trade. In fact there are so many factors which have to be considered these days that it is not surprising investors are going slow for the present until matters are clarified. Another factor which is making for caution is a disposition to await publication of the report of the tribunal which investigated the allegations of a Bank rate "leak."

With markets generally inactive and cautious, very little business has passed in foreign rails, which were generally quoted at virtually the same levels as a week ago. Antofagasta ordinary stock eased further from 19 to 18½, and the preference stock again changed hands around 35½. San Paulo Railway 3s. units were again quoted at 2s. 1½d., while United of Havana second income stock remained at 7¼ and the consolidated stock at 2s. Mexican Central "A" bearer debentures have risen from 71¾ to 72¼.

Costa Rica ordinary stock remained at 16½ and the first debentures were 72. Elsewhere Chilean Northern 5 per cent debentures were 35½. International of Central America common shares receded to $16½ and the preferred stock to $122.

There were only moderate fluctuations in Canadian Pacifics, which at $45¼ were virtually the same as a week ago; attention was drawn to the yield of over 5¼ per cent and to the probability that, although for the present the price must be expected to fluctuate, the present level is likely to prove attractive for the long-term investor wishing to acquire a financial interest in the future of Canada. The company's 4 per cent preference stock at £53 xd and the 4 per cent debentures at £63¼ were both virtually the same, as a week ago. In other directions, White Pass shares were fractionally better at $13¾.

Among shares of locomotive builders and engineers, Beyer Peacock 5s. shares were little changed at 8s. before the interim dividend announcement. Charles Roberts 5s. shares have also eased from 8s. 3d. to 8s. Westinghouse Brake, which remained under the influence of the excellent impression created by the financial results and 10 per cent dividend, have almost maintained their rise at 34s. 3d. Gloucester Wagon 10s. shares kept at 13s. 9d. and Wagon Repairs 5s. shares at 13s. 9d., while G. D. Peters were again quoted at 28s. 1½d.

British Timken have strengthened from 42s. to 42s. 6d., while T. W. Ward held their rise to 71s. 9d., but British Oxygen reacted to 30s. 6d. though the general belief is that the 10 per cent dividend will be maintained. The 10s. shares of the Dowty Group were again around 31s. while British Aluminium strengthened from 41s. 9d. to 42s. Ransomes & Marles 5s. shares were 10s., Richardsons Westgarth shares were 13s. 10½d. "ex rights" to the new 6 per cent convertible stock which was at a good premium of £3½. Steel shares eased slightly partly because of some selling to take up Colvilles' new 6 per cent convertible stock issue, which is expected in the City to attract a good response.

OFFICIAL NOTICES

DRAUGHTSMEN, also a Technical Assistant, required for West End office. Railway or automotive experience preferred. Pension Scheme also luncheon vouchers provided.—Apply in writing, stating age, experience and salary required, to: General Manager, British United Traction Ltd., 96 Piccadilly London, W.1.

RAILWAY Siding Contractors require ENGINEER/CONTRACTS MANAGER. Applicants must be able to estimate, set out and supervise contracts from commencement to completion. Progressive position and excellent salary to first class man.—Write full details to Box 511, *The Railway Gazette*, 33 Tothill Street, London, S.W.1.

POWER RECTIFIERS

A LARGE manufacturing firm in the Midlands requires an ENGINEER to assist in development and design of high power rectifier equipments. The Department handles rectifiers of all modern types and for all kinds of applications, offering scope for exceptionally wide experience and interest, with good salary and prospects. Previous rectifier experience not necessary, but an electrical or mechanical degree or approximate equivalent, and some practical experience, are desirable. Very good residential district, with excellent educational facilities of all kinds. —Apply with full details to Box 506, *The Railway Gazette*, 33 Tothill Street, London, S.W.1.

COAL RAIL TRAFFIC SUPERINTENDENT. A man fully experienced in operation and control of large-scale industrial railway wagon services required by West Midlands Divisional Coal Board for post of Traffic Superintendent for group of large collieries in southern part of their North Staffordshire Area. Salary within range £750-£1,150. Post is concerned with operation of rail services centred on Hem Heath and Stafford Collieries' sidings. Annual tonnage, currently 1¼ m. tons, planned to be doubled. DUTIES: Supervision of all locomotive and shunting staff; co-ordination of all wagon movements between sidings and neighbouring main line connection; servicing coal preparation plants and landsales at the collieries; responsibility for efficient utilisation of internal user wagons; responsibility for records compilation. Close liaison with Area Rail Transport Officer and respective Colliery Engineers required.—Applications (quoting ref. R.G.), giving complete information on experience, to Area Staff Manager, National Coal Board, North Staffs Area, Leek Road, Stoke-on-Trent, by January 27, 1958.

GHANA RAILWAY.—CIVIL ENGINEERS and ASSISTANTS are required in the Engineering Department for the maintenance of the track, bridges, buildings and other engineering works on a section of the Railway. Candidates should either (*a*) hold a B.Sc. (Eng.) or other recognised engineering degree and must have gained not less than 2 years' practical post-graduate experience or (*b*) being not less than 23 years of age have passed Parts I and II of the examinations of the Institution of Civil Engineers. Practical experience in Railway Engineering will be an advantage. Appointment will be on contract/gratuity terms for 2 tours of 18-24 months each in the salary scale £1,180 by £50 to £1,580; £1,660 by £60 to £2,080, entry point determined by age, qualifications and previous experience. Candidates with either of the minimum qualifications stated above will be appointed as Assistant Engineers on the minimum point (£1,180 a year). Candidates who have attained their 28th birthday and are A.M.I.C.E. and have had at least 5 years' post-qualification professional experience will enter the £1,660 point. Gratuity is payable on completion of contract at the rate of £8 6s. 8d. to £12 10s. for each completed month of residential service. Outfit allowance £30-60 on first appointment and Educational Allowance for children when not resident in Ghana of £100 a child for up to three children under 18 years. Free first-class passages for officer, wife and up to three children under 18 years. Generous home leave on full pay. Income Tax at low local rates. Preservation of superannuation or pension rights, where applicable, can be arranged. For further particulars and application form write stating age, qualifications and experience to the Director of Recruitment, Ghana High Commissioner's Office, 13 Belgrave Square, London, S.W.1.

PATENT No. 757622 "Resilient mounting of I.C. Engines" for sale or licence.—Apply: Chatwin & Company, Chartered Patent Agents, 253 Gray's Inn Road, London, W.C.1.

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